Exhibit F

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

OHIO PUBLIC EMPLOYEES RETIREMENT SYSTEM, Individually and on Behalf of All Others Similarly Situated, Plaintiff, vs. FEDERAL HOME LOAN MORTGAGE CORPORATION a/k/a FREDDIE MAC, et al., Defendants.	Case No. 4:08-cv-00160-BYP

REBUTTAL REPORT OF

PROFESSOR STEVEN P. FEINSTEIN, PH.D., CFA

OCTOBER 16, 2017

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I. SCOPE OF PROJECT AND REPORT

1. In my expert report dated 7 June 2017 ("Feinstein Report"), I examined factors that are generally accepted as indicative of the efficiency of the market in which a security trades. Based on my analysis of those factors, I concluded that the common stock of The Federal Home Loan Mortgage Corporation ("Freddie Mac" or the "Company") traded in an efficient market during the period from 1 August 2006 through 20 November 2007 (the "Class Period").

2. In the Feinstein Report, I showed that each of the *Cammer* and *Krogman* factors support a finding that Freddie Mac stock traded in an efficient market throughout the Class Period. (Feinstein Report, ¶18 and ¶145) I further demonstrated – through an event study – that Freddie Mac stock reacted promptly to new Company-specific information when it entered the market, which is the hallmark of an informationally efficient market. (Id., ¶19 and ¶146) In particular, the event study showed that Freddie Mac stock price reacted promptly and significantly to the corrective disclosure event tested. (Id., ¶19 and ¶146) Additional empirical tests that collectively examined the behavior of Freddie Mac stock on news dates further indicate that Freddie Mac stock responded to new Company-specific information throughout the Class Period. (Id., ¶144 and ¶147)

3. In addition, I described how a common damages methodology that is consistent with the Plaintiff's theory of liability can be applied to compute damages for all investors who purchased Freddie Mac stock during the Class Period. I explained that valuation tools would be applied to compute how much the stock price was artificially inflated on each day of the Class Period on account of the alleged misrepresentations and omissions. (Feinstein Report, ¶152(i-ii)) I explained that the inflation ribbon would be the basis of the per share damages computation, and that damages for each Class member would be a function of the change in artificial inflation and the change in price over the investor's holding period. (Id., ¶152(iii)) In the Feinstein Report I explained that "this analysis, after controlling for potentially non-fraud related information, would establish whether or not the alleged misrepresentations and omissions had caused the stock price to be artificially inflated, and if the corrective disclosure(s) caused the inflation to dissipate, in turn causing investor losses." (Id., ¶152(i))

4. Subsequently, I was asked by Markovits, Stock & DeMarco, LLC and Strauss Troy Co., LPA, Co-Lead Counsel for the Plaintiff, to consider and evaluate the arguments and conclusions in both the Expert Report of Mukesh Bajaj, Ph.D., dated 1 September 2017 (the "Bajaj

Report") and the Expert Report of Paul A. Gompers, dated 1 September 2017 (the "Gompers Report"), submitted by Defendants in this matter. I also reviewed the transcripts of the Deposition of Mukesh Bajaj, Ph.D., dated 26 September 2017 ("Bajaj Deposition") and the Deposition of Paul Gompers, Ph.D., dated 15 September 2017 ("Gompers Deposition").

5. The Bajaj Report focused on: 1) whether my analysis proved "a 'cause and effect' relationship between material information and Freddie Mac's stock price," demonstrating "that the market for Freddie Mac common stock was efficient over the Class Period;" (Bajaj Report, ¶16.1) and, 2) whether "economic evidence supports a finding that the alleged misrepresentations and omissions had no impact on the price of Freddie Mac's common stock." (Id., ¶16.2)

6. The Gompers Report focused on whether the "Plaintiff has articulated a methodology for calculating damages that can be applied on a class-wide basis in a manner that is consistent with Plaintiff's theory of liability in this case." (Gompers Report, ¶5)

7. This report presents my analysis and conclusions regarding the Bajaj Report, Bajaj Deposition, Gompers Report, and Gompers Deposition (collectively, "Defendants' Expert Testimony"). I have not been asked to opine on, or conduct any analyses, of loss causation. That my report may not address and/or respond to all of the arguments and opinions expressed in Defendants' Expert Testimony should not be considered a tacit acceptance of any of their opinions. I reserve the right to address such issues at the appropriate stage.

8. The documents I reviewed and relied upon in preparing this report in addition to those already cited in the Feinstein Report are listed in Exhibit-1. My credentials and compensation are presented in the Feinstein Report, as is a list of the testimony I provided during the four-year period preceding that report. Testimony that I have provided since the Feinstein Report is identified in Exhibit-2.

9. I reserve the right to amend, refine, or modify my opinion and reports, including in the event any new or additional information or analysis becomes available.

II. CONCLUSIONS

10. The Bajaj Report provides no reason to revise my conclusion that Freddie Mac stock traded in an efficient market during the Class Period. By his own admission, Dr. Bajaj conducted no independent investigation to assess whether the market for Freddie Mac stock was efficient or inefficient during the Class Period. Accordingly, Dr. Bajaj never claims to have proved nor contends that the market for Freddie Mac stock was inefficient during the Class Period.

11. In the Feinstein Report, I showed that each of the *Cammer* and *Krogman* factors supports a finding that Freddie Mac stock traded in an efficient market throughout the Class Period. Dr. Bajaj does not dispute any of my findings that Freddie Mac stock satisfied the *Cammer* factors of trading volume, analyst coverage, and number of market makers. He does not dispute that Freddie Mac satisfied the properties underlying the *Cammer* factor of Form S-3 eligibility, namely the size of the Company's float and the availability of financial data provided to the marketplace. Furthermore, Dr. Bajaj does not dispute that Freddie Mac stock satisfied each of the *Krogman* factors – large market capitalization, large float, and narrow bid-ask spread during the Class Period.

12. Dr. Bajaj does not dispute that Freddie Mac's stock exhibited a statistically significant negative price reaction to the revelation of new Company-specific information on 20 November 2007. A statistically significant stock price return in response to information entering the market on this date proves that the price of Freddie Mac stock moved in reaction to new unexpected Company-specific information. This result is a demonstration of a cause and effect relationship between the release of new unexpected information and a reaction in the market price of Freddie Mac stock. This price behavior demonstrates market efficiency, and in conjunction with the other *Cammer* and *Krogman* factors proves the market was efficient throughout the Class Period.

13. Dr. Bajaj does not identify any additional date that should have been included in my event study test based upon my objective selection criteria, nor does he proffer what the requisite number of news days for such a study should be in this case. None of his criticisms dismiss the compelling evidence of market efficiency that the event study test provides.

14. Dr. Bajaj challenges the validity of the Z-test for assessing market efficiency. However, his challenges are misguided, as they are based upon an improper definition of market efficiency. The statistical issues Dr. Bajaj raises as challenges to the validity of the Z-test findings are erroneous and moot, because, as Dr. Bajaj acknowledges multiple times in his report, none of the purported statistical problems he identifies affect the qualitative results of the Z-test in this case. As such, his arguments and assertions do not detract from the evidence of market efficiency that the results of the Z-test provide.

15. Dr. Bajaj improperly conflates fundamental and informational efficiency, and applies a definition of market efficiency that conflicts with the definition set forth in the decisions of numerous courts, including the Supreme Court's recent decision in *Halliburton II*.

16. Dr. Bajaj implicitly accepts that the market for Freddie Mac stock was an efficient market. His purported finding that "the alleged misrepresentations and omissions had no impact on the price of Freddie Mac's common stock," rests on his conclusion that the statistically significant decline in Freddie Mac's stock price on 20 November 2007 was due to the disclosure of Company-specific information, albeit information that he contends was not corrective of the alleged misrepresentations and omissions. His contention that it was other information that caused the stock price decline that day necessarily acknowledges a cause and effect relationship between information and price response, which is the essence of informational efficiency.

17. Dr. Bajaj's conclusion that the "the alleged misrepresentations and omissions had no impact on the price of Freddie Mac's common stock" (Bajaj Report, ¶16.2), is based on the results of the same statistical test, the Z-test, that he contends "lacks a proper scientific basis" (Id., ¶83), and which he contends is "incapable of demonstrating a 'cause and effect' relationship between new, material news and Freddie Mac's stock price." (Id., ¶88) For his price impact argument, however, Dr. Bajaj uses the very test that he contends is invalid in his market efficiency argument. The implication from this inconsistency is inescapable – Dr. Bajaj's analysis is not an objective assessment of the analysis, findings, and conclusions presented in the Feinstein Report, and as such, the conclusions Dr. Bajaj presents are unreliable.

18. But, Dr. Bajaj's price impact argument suffers from a more fundamental fatal flaw. Dr. Bajaj incorrectly contends that without a Z-test, proof that alleged inflationary events were statistically significant at a greater incidence rate than typical days in the Class Period, the alleged

misrepresentations and omissions could not possibly have impacted the Freddie Mac stock price. This premise is patently false.

19. That Dr. Bajaj does not observe statistically significant price movements in the Freddie Mac stock price on the alleged misrepresentation and omission dates proves nothing. His contention that in order for there to be price impact the misrepresentations and omissions must elicit statistically significant stock price increases when made is misinformed. Dr. Bajaj overlooks the fact that the misrepresentations and omissions concealed important risks and thereby maintained the pre-existing mix of valuation-relevant information, such that the impact of the misrepresentations and omissions on the stock price was to maintain the stock price at an artificially inflated level relative to the but-for full disclosure price. Dr. Bajaj also disregards that the misrepresentations and omissions may have caused the stock price to rise, but by amounts that were below the threshold for statistical significance at the 95% confidence level. His failure to prove sometimes that the price rose in response to misrepresentations and omissions does not prove that the price did not do so. A modest increase in price that is below the threshold for statistical significance may have been the appropriate price impact, or alternatively, on account of noise in the data, the statistical test may have been too weak to detect the price increase.

20. Furthermore, Dr. Bajaj bends over backward to dismiss one occurrence of a statistically significant price increase that occurred on the date of an alleged misrepresentation – 27 February 2007. Only with a series of inappropriate adjustments to the standard event study test is Dr. Bajaj able to contend that the price increase that day may not have been evidence of a statistically significant price impact. Appropriate statistical methodology proves that it was.

21. The Gompers Report provides no reason to revise my conclusion that damages in this matter can be computed for all Class Members using a common methodology that is consistent with the Plaintiff's allegations.

22. Dr. Gompers accepts my proposed application of an inflation ribbon methodology to compute damages on a class-wide basis. He does not criticize the approach. Instead, Dr. Gompers takes issue with potential complexities that may arise in the process of constructing such an inflation ribbon. Dr. Gompers' contention is that I have not provided the exact detail in which I would deal with any of the potential valuation complexities that could arise. This level of granularity in addressing potential valuation issues is not required at this stage of the litigation. Rather, all of these potential valuation issues Dr. Gompers raises can and will be addressed in a

loss causation and full damages report. None are insurmountable, as this sort of analysis is performed routinely in financial markets, as well as in most class action securities cases. There are valuation tools, derived from financial principles and the literature, specifically for this purpose. Dr. Gompers acknowledges that "the underlying pinnings of modern finance" is to "examine how – how information translates into price." (Gompers Deposition at 60:11-14) Importantly, I have not conducted a loss causation analysis at this time and reserve the right to address such issues at the appropriate stage should I be asked to do so.

III. CRITIQUE OF THE BAJAJ REPORT

A. The *Cammer* and *Krogman* Factors Indicate Market Efficiency

23. Neither in his report nor in his deposition testimony does Dr. Bajaj dispute any of my findings concerning the following *Cammer* and *Krogman* factors, which indicate the efficiency of the market for Freddie Mac stock during the Class Period:

(i) **Trading Volume** - Average trading volume was approximately 4.0 million shares per day, with average weekly trading volume of 3.0% of shares outstanding. (Feinstein Report, ¶¶53-54)

(ii) **Analyst Coverage and Other Avenues of Information Dissemination** - There was broad coverage of Freddie Mac stock during the Class Period. I obtained analyst reports on Freddie Mac published during the Class Period by 11 different firms. Ten additional firms participated in Freddie Mac conference calls. Thus, at least 21 different firms covered Freddie Mac during the Class Period. (Id., ¶¶58-60) Additionally, at least 616 major institutions owned Freddie Mac stock during the Class Period. (Id., ¶64)

(iii) **Market Makers and Trading Platform** – Freddie Mac stock traded on the NYSE, and there were at least seven market makers for Freddie Mac stock during the Class Period. (Id., ¶¶72-73)

(iv) **S-3 Registration Eligibility** – Freddie Mac's average float during the Class Period of $42.1 billion exceeded the threshold requirement for S-3 registration by a wide margin. Due to the Company's status as a GSE, it was not required to and

did not file Exchange Act reports with the SEC, such as the Form 10-Q or the Form 10-K during the Class Period. However, regularly throughout the Class Period, Freddie Mac did issue to its shareholders quarterly and annual financial reports containing essentially the same information that would be included in the Form 10-Q and Form 10-K Exchange Act reports. Therefore, financial information about Freddie Mac was readily and consistently available to market participants. Freddie Mac certainly possessed the float and information provision characteristics underlying why S-3 eligibility is indicative of market efficiency. (Id., ¶¶80-83)

(v) **Market Capitalization** - During the Class Period, Freddie Mac's market capitalization averaged $42.1 billion, putting it in the 1st decile by size compared to all publicly traded companies on the NYSE, AMEX, NASDAQ, and ARCA (i.e., it was larger than at least 90% of all other public companies traded on U.S. exchanges). (Id., ¶85)

(vi) **Float** – Freddie Mac stock float averaged $42.1 billion during the Class Period, which was larger than the market capitalizations of at least 90% of all other publicly traded companies in the U.S. (Id., ¶88)

(vii) **Bid-Ask Spread** – Freddie Mac's average bid-ask spread was 0.12%, which was substantially narrower than the 0.60% average month-end bid-ask spread for all publicly traded companies on the NYSE, AMEX, NASDAQ, and ARCA. (Id., ¶94)

24. In a past case (*Allergan*), where Dr. Bajaj offered an opinion that a market was indeed efficient, he concurred that satisfying each of these factors supports a finding of market efficiency. Specifically, he concluded that:

(i) "the active trading of Allergan stock is supportive of a finding that Allergan stock traded in an efficient market." (Bajaj Allergan Report, ¶22)

(ii) "the number of stock analysts covering Allergan stock, as well as the large number of institutions that owned Allergan stock, are both indicative that Allergan stock traded in an efficient market." (Id., ¶26)

(iii) "the presence of a number of such market makers for Allergan's common stock is indicative that the market for the common stock was efficient." (Id., ¶27)

(iv) "Allergan stock's large market capitalization indicates market efficiency." (Id., ¶32)

(v) "Allergan stock's large float indicates market efficiency." (Id., ¶33)

(vi) "Allergan stock's narrow bid-ask spread indicates market efficiency." (Id., ¶34)

25. In fact, in this previous case, he agreed that "it is reasonable to infer that the observed stock prices are determined in an efficient market" based on an analysis of the first four *Cammer* and three *Krogman* factors alone.

> "Intuitively, for a large capitalization stock like Allergan with many market analysts, high trading volume, active flow of information and listing on a well-developed public exchange such as the New York Stock Exchange ('NYSE'), it is reasonable to infer that the observed stock prices are determined in an efficient market."
> **Bajaj Allergan Report, ¶18.**

26. However, when asked whether he agreed with this statement during his deposition in the current case, in which Dr. Bajaj's opinion is to refute a finding of market efficiency, he testified as follows: "No, I can't say yes to that the language that you used in your question. I would say that all those factors facilitate an efficient market." (Bajaj Deposition at 177:21-24) Dr. Bajaj offers no explanation for why his opinions in the current case contradict those in his prior case.

1. Dr. Bajaj's Reference to Anomalies Observed in the Literature is Inapplicable and Uninformative

27. In the Bajaj Report, Dr. Bajaj contends that "even the prices of well-capitalized companies' stocks that traded on major exchanges, that would easily satisfy the structural factors that serve only as indicia of market efficiency, may not be semi-strong form efficient over extended periods." (Bajaj Report, ¶30). Dr. Bajaj references four academic articles, in which the authors investigate anomalous events where a handful of stocks exhibited isolated and brief periods of inefficiency. Contrary to Dr. Bajaj's portrayal of this literature, however, the examples in these articles are rare exceptions to the pervasive efficiency of well-developed stock markets, not a

general rule. For example, one study examines impediments to arbitrage "using a sample of 82 situations between 1985 and 2000, where the market value of a company is less than that of its ownership stake in a publicly traded subsidiary." ("Limited Arbitrage in Equity Markets," Mark Mitchell, Todd Pulvino, and Erik Stafford, *The Journal of Finance*, 2002, p. 551.) They cautioned that even this sample of 82 situations, from the thousands of publicly traded companies during this 15-year period, examples, "are not risk-free arbitrage opportunities." (Id., p. 553)

28. That the examples in these articles are anomalous exceptions is evident even in the title of the paper by Lamont and Thaler that Dr. Bajaj cites: "Anomalies: The Law of One Price in Financial Market." Tellingly, Dr. Bajaj omits the word "anomalies" from the title in his citation of this article. See e.g., "Lamont, Owen A. and Richard H. Thaler (2003), 'The Law of One Price in Financial Markets,' *Journal of Economic Perspectives*, Vol. 17(4), pp. 191-202," as cited in footnote 36 of the Bajaj Report. Furthermore, Dr. Bajaj cites another article published the same year by the same authors that warned that the incidences of inefficiency are so rare and brief that "[W]e caution readers not to rush out to form hedge funds to exploit this phenomenon . . ." ("Can the Market Add and Subtract? Mispricing in Tech Stock Carve-Outs," by Owen Lamont and Richard Thaler, *Journal of Political Economy*, 2003, p. 242)

29. The third article cited by Dr. Bajaj, titled the "Chipotle Paradox," noted that an anomalous trading pattern was the basis for their entire study:

> "It is the anomalous pattern of trading since October 16, 2006 and following the final McDonald's disposition of its entire interest in Chipotle, that constitutes the Chipotle Paradox."
> **"The Chipotle Paradox," by Mark Fedenia and Mark Hirschey, *Journal of Applied Finance*, Issues 1 & 2, 2009, p. 145.**

30. Clearly, the rare incidences of inefficiency cited in these articles, and by Dr. Bajaj in his report, are extremely unusual exceptions, rather than common or regular occurrences. Dr. Bajaj could not provide a single example that such a situation existed in Freddie Mac stock during the Class Period. It is clearly far more likely than not that Freddie Mac stock would conform to the norm, especially because the first four *Cammer* and three *Krogman* factors indicate market efficiency, rather than join the short list of rare anomalies. Dr. Bajaj's insinuation to the contrary is baseless.

a. Dr. Bajaj Does Not Present Any Empirical Evidence That the First Four Cammer and Three Krogman Factors Do Not Support a Finding of Market Efficiency

31. If Dr. Bajaj's citations of academic literature examining anomalous stock price behavior is meant to suggest that the market for Freddie Mac stock *could* be inefficient even though it satisfied all *Cammer* and *Krogman* factors, Dr. Bajaj has failed to offer any evidence in support of his hypothesis. In past cases Dr. Bajaj has performed empirical tests to demonstrate whether the market for a particular security is weak-form efficient. In the instant matter, Dr. Bajaj states that "there are several tests of weak-form efficiency discussed in the finance literature, including Serial Correlation, Put-Call Parity, and Y-filter Tests." (Bajaj Report, FN. 34) In the four reports he has submitted to date in this matter, however, he performs no such tests.

32. In the *Allergan* case, Dr. Bajaj performed these tests to determine whether the market for Allergan stock was weak-form efficient during the class period.

> "Allergan stock did not provide an ability to exploit price trends and thus traded in an efficient market.
> …
> Serial correlation analysis confirms that auto-correlation was absent in Allergan's stock during the Class Period.
> …
> Y-Filter test results demonstrate that no excess profits could be earned in Allergan stock through momentum trading strategies during the Class Period."
> **Baja Allergan Report, Sections VI, VI.1, and VI.2.**

> "The put-call-parity test, conducted on a second-by-second basis, also demonstrates that Allergan stock traded in an efficient market during the Class Period."
> **Id., Section VII.B.**

33. In a related case concerning Freddie Mac Series Z Preferred Stock, Dr. Bajaj performed these same empirical tests, which he omits from his reports in the current case.

> "I found that starting July 7, 2008 through the end of the Alleged Class Period, Series Z's daily returns ***were*** significantly positively related to the Company's common stock returns the previous day."
> **Expert Report of Mukesh Bajaj, *In re Federal Home Loan Mortgage Corp.*, No. 09 Civ. 832 (MGC), dated 15 August 2011, ¶22(a) (emphasis in original).**

> "I demonstrate that intra-day trading in Series Z using such y-filter trading strategies would generate significant expected profits from July 7, 2008 through the end of the Alleged Class Period, even after accounting for transaction costs and commissions."
> **Id., ¶22(b).**

> "There was a significant increase in put-call parity violations for Freddie Mac's common stock during specific periods of capital market turmoil before and during the alleged class period."
> **Id., Section B(i).**

34. In the AIG matter, Dr. Bajaj conducted a serial correlation analysis, a Y-Filter test, and a put-call parity test to support his opinion that AIG common stock did not trade in an efficient market during a portion of the class period.

> "I conducted several well-accepted tests to examine whether AIG's stock traded in an efficient market during the Alleged Class Period, as Lead Plaintiff assumes. As noted earlier, if limits on arbitrage arise, then securities markets may be rendered inefficient, with the Law of One Price no longer holding as arbitrage opportunities persist. I discuss the three types of tests (put-call parity, regression, and y-filter trading profits tests) I conducted in detail in the following sections. All three tests demonstrate that arbitrage profits involving the trading of AIG stock were feasible from June 16, 2008 through the end of the Class Period, indicating that AIG's stock traded in an inefficient market during that time."
> **Expert Report and Declaration of Mukesh Bajaj, *In re: American International Group*, 17 August 2011, ¶82.**

35. Dr. Bajaj's conclusions in the prior cases investigating AIG common stock and Freddie Mac preferred stock were that for some periods of time the market for each of the respective securities was inefficient. In the *Allergan* case, he concluded from the results of those tests that the market was efficient. For the current case, investigating Freddie Mac stock, Dr. Bajaj

has either inexplicably deviated from his prior methodologies and opted not to conduct those tests, or he did conduct those tests but chose to omit the results from his reports.

36. Despite insinuating that Freddie Mac stock may have traded in an inefficient market during the Class Period, Dr. Bajaj did not identify any purported inefficiency using the same tests he applied several times in past cases for assessing market efficiency. As he provides no evidence to the contrary, and does not dispute the very *Cammer* and *Krogman* factors that he previously deemed to be valid indicators, Dr. Bajaj's protestation that my analysis does not establish that Freddie Mac stock traded in an efficient market over the course of the Class Period is baseless.

B. My Event Study Methodology Is Appropriate and Demonstrates Market Efficiency for Freddie Mac Stock Throughout the Class Period

37. As described in the Feinstein Report, I conducted an event study to determine whether Freddie Mac stock "reacted to new information and its market was efficient, and, in particular, efficient with respect to the information at issue in this case." (Feinstein Report, ¶137) I further explained that, "this approach is particularly appropriate where, as here, it appears that the alleged misrepresentations were confirmatory of market expectations, and were therefore unlikely to elicit any statistically significant common stock returns." (Id., ¶100) Based on the above, I identified 20 November 2007 as an allegation-related event, "which, based on valuation principles, would reasonably be expected to elicit a stock price reaction over the threshold for statistical significance." (Id., ¶115)

38. As detailed in the Feinstein Report, Freddie Mac's residual return (the return after controlling for market and peer group effects) of -32.13% on 20 November 2007, is associated with a *t*-statistic value of -19.30. (Feinstein Report, ¶136) The likelihood of obtaining a residual return of this magnitude and associated *t*-statistic given that particular explanation (a random fluctuation unrelated to the news) is virtually nil. I explained in the Feinstein Report, that the event study showed:

> "that for the allegation-related event, there was a strongly statistically significant price reaction to Company-specific news. This finding proves that Freddie Mac common stock reacted to new information and its market was efficient, and, in particular, efficient with respect to the information at issue in this case."
> **Feinstein Report, ¶137.**

39. Dr. Bajaj does not challenge the regression model used in my event study or the statistical significance of the 20 November 2007 event. Nor does Dr. Bajaj dispute that the price movement in Freddie Mac stock is attributable to the Company-specific news that transpired that day. Nor does he dispute that the price reaction that day was the efficient and appropriate reaction given the Company-specific news announced that day.

40. Dr. Bajaj appears to have three main criticisms of my event study: 1) that the results of my event study cannot prove market efficiency for the entire Class Period; (Bajaj Report, ¶57) 2) that my event selection was biased; (Id., ¶58) and, 3) that the information disclosed on 20 November 2007 was not related to the allegations. (Id., ¶67) None of these criticisms are valid.

1. My Event Study Together with an Analysis of the *Cammer* and *Krogman* Factors, Demonstrates Market Efficiency for Freddie Mac Stock

41. Based on the event study results, on the collective empirical test, and on the analysis of the first four *Cammer* and three *Krogman* factors, I correctly concluded that Freddie Mac stock traded in an efficient market throughout the Class Period. In my deposition, I reiterated the point that my conclusion was based on all of the evidence, holistically:

> "Q. The single-event event study is not enough on its own to prove market efficiency for the entirety of the class period; isn't that correct?
>
> A. If you mean by that eliminating consideration of the *Cammer* and *Krogman* factors, it depends on what standard of proof. For some purposes it might be. Maybe for the court, it would be. For me to stake my reputation on, it wouldn't be. But that's hypothetical, because in the real world, what I am staking my reputation on is I ran many additional tests: the *Cammer* test, the *Krogman* factor test and the collective test."
> **Feinstein Deposition at 179:8-23.**

42. Dr. Bajaj's argument that Class Period market efficiency cannot be proved with a single event is a straw man of his own invention, as my conclusion of Class Period market efficiency was proved by Class Period *Cammer* and *Krogman* factors, together with a Class Period collective test, and in concert with an event study focusing on the most appropriate single event involving the allegation-related information. In fact, I performed a single event date event study, in conjunction with a collective test, in the *Prudential* matter for which the class was certified. (*City of Sterling Heights General Employees' Retirement System v. Prudential Financial, Inc., et*

al., No. 2:12-cv- 05275-MCA-LDW (D.N.J.), 31 August 2015) When Dr. Bajaj erroneously contends that my event study analysis on 20 November 2007 cannot be "imputed *to the entire Class Period*," (Bajaj Report, ¶50 emphasis in original) he ignores all the indicia of efficiency presented in the Feinstein Report. Without any evidence to the contrary, his opinion is untenable.

43. Further, Dr. Bajaj asserts that "no academic literature supports the view that market efficiency over an extended period of time may be established by testing only one date, and the existing literature supports the opposite conclusion." (Bajaj Report, ¶49). Not only is this not what I did in my analysis and report, but the only example of academic literature that Dr. Bajaj could cite to support his assertion was an article he himself wrote stating the same unsupported opinion. ("Assessing Market Efficiency for Reliance on the Fraud-on-the-Market Doctrine After Wal-Mart and Amgen," by Mukesh Bajaj, et al., *Law and Economics*, Volume 26, 2014) Given all of the indicia of efficiency and Dr. Bajaj's failure to cite a single specific case fact to the contrary, Dr. Bajaj's opinion is untenable.

2. Dr. Bajaj's Allegation of Potential Selection Bias is Erroneous

44. Dr. Bajaj asserts that my event selection criteria suffer from selection "bias" which renders "the result scientifically unreliable." (Bajaj Report, Section IV.B.1.c) Dr. Bajaj contends that because my identification of event dates was partially informed by my reading of the Complaint, it was a foregone conclusion that the returns on the dates I selected would be statistically significant. He therefore claims that my conclusion "that market efficiency is proven because the stock price's movement was statistically significant, is entirely circular and proves nothing." (Id., ¶61). It is important to note that in the *Allergan* case, Dr. Bajaj's event study included a test of two dates, including the final disclosure at the end of the class period, and both of these price reactions were detailed in the complaint in that case. (Bajaj Allergan Report, ¶¶53-61) Consequently, Dr. Bajaj's analysis in the Allergan case contradicts the standards he applies in the instant case.

45. Regardless, Dr. Bajaj is wrong. The selection of the 20 November 2007 event was based on the content of the news that transpired that day. The selection of the collective study events was based on the objective screen described in the Feinstein Report, which relied on coverage by the *Wall Street Journal* and the *New York Times*. (Feinstein Report, ¶139) No one can reasonably contend that the information disclosed on 20 November 2007 was unimportant or

focused upon by market participants, analysts, the news media, and ultimately by plaintiffs for spurious reasons disconnected from the news that transpired that day. That I too should focus on this event for a market efficiency event study was a result of the important news that came out, not the fact that others also observed and reacted to that important news.

46. Dr. Bajaj cannot and does not dispute that the 20 November 2007 event date was an important date in the life of the Company during the Class Period. As such, it is objectively an appropriate event date for a market efficiency event study.

C. The Results of My Collective Test Are Evidence of Market Efficiency

47. In addition to criticizing the event study results and conclusions drawn from testing 20 November 2007, Dr. Bajaj also takes exception to my reliance on the Z-test result that indicated informational market efficiency. As explained in the Feinstein Report, I used the Z-test to "test for market efficiency by assessing collectively whether the stock has a greater frequency of statistically significant price movements on days with greater information flow ('news dates') than on more typical days ('non-news dates')." (Feinstein Report, ¶139) If Freddie Mac stock price movements are more frequently statistically significant among the collection of news dates than among all other days, this result establishes that there is a cause and effect relationship between the flow of information and stock price movements, which indicates market efficiency.

48. In the case of Freddie Mac stock during the Class Period, the proportion of news days with statistically significant movements was 44.4% as compared to a 5.9% incidence rate for the more typical days. The proportion of news days with statistically significant price movements is 7.5 times greater than that of non-news days. The difference in proportions is meaningful and statistically significant. (Feinstein Report, ¶¶142-143)

49. Importantly, Dr. Bajaj does not dispute that the Z-test is a valid statistical test. Instead, Dr. Bajaj produces several misguided criticisms that focus on what is not necessary for the test to show (fundamental efficiency) rather than what the test appropriately does show – a cause and effect relationship between information and stock price movements, which demonstrates the essence of informational efficiency.

50. In addition to attacking conceptual use of the Z-test and collective tests in general for assessing market efficiency, Dr. Bajaj claims to identify a number of statistical problems with the Z-test I ran. But, none of the statistical details Dr. Bajaj brings up is material or affects the qualitative results of the test at all, as his own adjustments to the test illustrate, and as the diagnostic tests I conducted also prove.

51. Moreover, despite his criticism of the Z-test, and collective tests in general, Dr. Bajaj relies on the Z-test in an attempt to demonstrate a lack of price impact of the alleged misrepresentations and omission.

1. The Z-Test is A Widely Used Statistical Test that Has Been Used in Literature and Accepted by Courts as Demonstrative of Market Efficiency

52. Dr. Bajaj contends that the Z-Test is not "an appropriate or reliable method for assessing market efficiency." (Bajaj Report, ¶87) Importantly, he agrees that the Z-test is a valid statistical test that has "been used for decades as a test for whether two proportions are statistically different." (Id., ¶82) Dr. Bajaj argues that a statistical test, like the Z-test, that compares price changes on a sample of news days to a sample of non-news days is "not a method that is generally accepted among economists to establish market efficiency." (Id.)

53. Dr. Bajaj is wrong. The usefulness of tests that compare price changes on news day to non-news days for purposes of assessing informational market efficiency in securities cases is now widely used and well documented. For example, such tests were recognized by the group of eight testifying finance experts (including but in addition to myself) who wrote an Amici Curiae brief for *Halliburton II* as legitimate tests for market efficiency.

> "Another way to perform an event study is to divide the days of the class period *ex ante* into expected news days and non-news days before examining price movements, and then compare the stock's price movements in the two categories to see if there is a statistically significant difference in price movement between the two categories. If the study finds

> a difference in price movement between the two sample sets (*e.g.*, earnings-release dates versus non-earnings-release dates), that is statistical evidence that the market incorporates new public information into the price of the stock."
> **Brief of Testifying Economists as Amici Curiae in Support of Respondent, *Halliburton Co. and David Lesar v., Erica P. John Fund, Inc., FKA Archdiocese of Milwaukee Supporting Fund, Inc.*, 5 February 2014, p. 10.**

54. Several courts have accepted the Z-test, or similar tests that compare price changes on a sample of news days to a sample of non-news days, as valid tests for establishing market efficiency.

> "There is no dispute that z-tests are commonly used and widely accepted statistical tools. … [Defendant's expert] contends that, because the article was not peer-reviewed, a z-test cannot be used to show market efficiency. Were Feinstein using a novel or questionable statistical technique, the Court would place more weight on the absence of peer review. But it is not necessary for every application of a commonly used statistical technique to be peer-reviewed. Indeed, the elegance of statistical methods is that they can be applied to data sets of varying substantive significance, from rates of emphysema to transactions on modern securities markets. Because the Court is convinced that the z-test is a well-established and sound statistical technique, the lack of peer review does not seriously undermine Feinstein's application of the z-test."
> ***In re Petrobras Securities Litigation*, No. 14-cv-9662 (JSR) (S.D.N.Y. Feb. 2, 2016).**

> "Plaintiffs' expert[] conducted an event study using Tidel's trading data. He identified two-day periods in which information pertaining to Tidel was released to the public and separated those two day[] [periods] from other two day periods in which there was no public information pertaining to Tidel. The periods were classified into "information" versus "non-information days" …. [Plaintiffs' expert] concluded that the price changes on information days versus non-information days was statistically significant, meaning there was a related cause and effect relationship between [a] the release of information pertaining to Tidel and [b] Tidel's stock price. Simply put, [Plaintiffs' expert's] tests indicated that Tidel's stock price reacted within a two day window to news releases concerning Tidel, which indicates market efficiency."
> ***Lehocky v. Tidel Tech., Inc.*, 220 F.R.D. 491 (S.D. Tex. 2004).**

> "The expert also concluded FCStone's stock was approximately one-and-a-half to two times as likely to experience a change in stock price on days when company-specific news was announced than on days when it was not. However, for legal purposes, the critical question is whether the price quickly absorbs and reflects news about the company because this is what allows the legal presumption that (1) the price incorporates public information and (2) the investor relied on the price as the repository of that public information. [The defendants' expert's] report establishes that when news about the company is made public, the company's stock price immediately incorporates the information. This is the essence of an efficient market — perhaps not for an economist's purposes, but for purposes of *Basic*."
> ***Lumen v. Anderson*, No. 08-0514-CV-W-HFS (W.D. Mo. Feb. 10, 2012).**

> "For that reason, courts have instead endorsed the comparison test that [Plaintiffs' expert] used. See, e.g., In re Alstom SA Sec. Litig., 253 F.R.D. 266, 280 (S.D.N.Y.2008). This test 'involves comparing the percentage of days with news that have a statistically significant price movement to the percentage of days without news that have a statistically significant price movement.' Paul A. Ferrillo et al., The 'Less Than' Efficient Capital Markets Hypothesis: Requiring More Proof from Plaintiffs in Fraud-on-the-Market Cases, 78 St. John's L. Rev. 81, 120 (2004). If the stock price is significantly more likely to change on News Days than on Non-News Days, that suggests a causal relationship between material news and the stock price."
> ***McIntire v. China Media Express Holdings, Inc.*, 38 F. Supp. 2d 415 (S.D.N.Y. 2014)**

55. Widespread support for collective tests that compare price changes on a sample of news days to non-news days as tests of market efficiency is further evident in the article written by Hartzmark and Seyhun [2011].

> "Assume for the moment that a stock does not trade in an efficient market, meaning that the daily stock prices do not reflect full information and significant abnormal returns are not associated with the disclosure of information. It then logically follows that, for a security trading in an inefficient market, we will observe that: a) the securities' returns are determined arbitrarily or in a random fashion, and b) there will be no link between disclosures and significant abnormal returns – in other words, disclosures and significant returns are randomly distributed. To test this hypothesis, we have established a new statistical method employing a generally accepted approach called *Bootstrap testing*. This approach has been accepted by both the *DVI* and *HealthSouth* courts. We have created test statistics to determine if the actual observations are likely to have been

> generated in a random fashion. If information disclosures are not linked to abnormal returns, then we would not expect there to be a statistically significant relationship that distinguishes those days when there are/are not disclosures of information from those days when there are/are not abnormal returns. In other words, there is no cause-and-effect correlation, because, in an inefficient market, the distributions of abnormal returns and disclosures are both random events."
> **"The Curious Incident of the Dog That Didn't Bark and Establishing Cause-and-Effect in Class Action Securities Litigation," by Michael L. Hartzmark, and H. Nejat Seyhun, *Va. L. & Bus. Rev.* 6 (2011): 415. (emphasis in original).**

56. Consequently, Dr. Bajaj is wrong to suggest that the Z-test does not provide reliable affirmative evidence of market efficiency, or that it is not widely used and generally accepted. It is widely used, supported in the literature, and accepted by many courts.

2. Economists Do Not Require at Least 80% to 90% of Information Events to be Statistically Significant in an Efficient Market

57. The collective Z-test differs from a traditional event study focusing on a single event, such as the event study examining the 20 November 2007 event, in the manner events are selected and in the manner the event results are interpreted. A traditional event study requires identification of events when material information was disseminated that was new, unconfounded, and so momentous that one would expect the stock price reaction to be statistically significant. Such events are, by design, rare. The Z-test, alternatively, identifies a group of news events, which would reasonably have a greater flow of information than what transpires on more typical days.

58. The Z-test examines whether the security price movements within the selected group of events collectively reflect the greater flow of information by exhibiting a greater incidence of statistically significant events than the roughly 5% significance rate that occurs on typical days. In this manner, the Z-test assesses whether the stock reacts to information, which is the hallmark of informational efficiency, or alternatively, whether the market appears to ignore material information, which is informational inefficiency.

59. The Z-test collection of events are not pre-screened such that they each are of such importance as to reasonably elicit a significant stock price reaction. Rather, they are screened to ascertain whether or not they fit the established objective criterion indicating greater than typical

material information flow. As such, not all events in the collection are expected to be statistically significant. A cause and effect relationship between information and stock price movements is established by a significantly greater incidence rate of significant events, but that rate need not be 100%, 90%, or 80%, contrary to Dr. Bajaj's misunderstanding of the test design.

60. Dr. Bajaj constructs an unrealistic and incorrect standard for demonstrating informational market efficiency. Specifically, Dr. Bajaj baselessly opines that the market must react to news at least 80%-90% of the time such that "it would not be distinguishable statistically from the market reacting every time to material news." (Bajaj Report, ¶93, FN102) Throughout his report and testimony, Dr. Bajaj repeats this unrealistic and unsupported standard.

> "Q. Is it your opinion that every piece of material news about a stock should be expected to move the stock price in a statistically significant manner?
> …
> A. So depending on the sample size, if you demonstrate cause and effect on 80 or 90 percent of the dates, that would be sufficient in my view. There's always some form of statistical noise, so the test is if it's statistically close enough to be a hundred percent of the time."
> **Bajaj Deposition at 53:22-25 and 54:14-20.**

> "A. if you observe that often enough, then you would say you have not established, empirically, cause and effect. There's – we talked about, depending on the sample size, 80 to 90 percent threshold."
> **Id. at 57:18-23.**

> "Q. Would you agree that there could be news that is material, unexpected, and value relevant that does not result in a statistically significant stock-price reaction?
>
> A. Well, that could be the case if the market is not semi-strong form efficient. That could be the case every once in a while, going back to the earlier comment of 80 to 90 percent of the time, once you observe a stock-price reaction."
> **Id. at 73:20-74:6.**

> "By the definition of market efficiency, which Dr. Feinstein agreed with, the implication is in each and every percent, a hundred percent of the cases, in each and every case, when there is material news, there should be a price impact. And there are many authorities, some of which I've cited in my report, that are absolutely consistent with that. And Judge Cedarbaum couldn't be clearer in a related case of Freddie Mac-Quasar. That is the

> standard. That's her understanding of the standard too, to say that there is no magic number in proportion. The most charitable interpretation of that sentence is, it is, in fact, a magic number. It's a hundred percent. But given the noise in the data, depending on the sample size, sometimes you could say, 'Well, 80 percent of material news days eliciting a price response is close enough to be statistically inextinguishable from a hundred, sometimes it might be 90.' And I've given you some calculations, some examples as to how that less than a hundred percent but close enough to a hundred percent works. And that is the standard. There is no other standard."
> **Id. at 166:15-167:18.**

> "Citing to my testimony in the matter, Judge Cedarbaum noted that 'an economist may conclude that a market is efficient if it reacts to news 80 to 90% of the time, depending on the number of news dates at issue.'"
> **Bajaj Report, ¶93.**

> "if the market reacted to such news 80% to 90% of the time, it would not be distinguishable statistically from the market reacting every time to material news. In other words, if one is testing whether a stock price reacts to all material news, statistically, the price reaction should be observed at least 80% to 90% of the time, depending on the sample size. For example, if we assume 9 news dates, and we observe a statistically significant reaction on 8 of them (or about 89%), the result would be statistically indistinguishable from observing a significant price reaction on 99% of the days."
> **Id., ¶93 FN 102.**

61. As explained in the Feinstein Report and my deposition, whether an event exhibits a statistically significant price reaction depends on a number of factors, among which is the efficiency of the market. (Feinstein Report, ¶¶106-110) (Feinstein Deposition at 159:3-15) Other factors that influence whether an event exhibits a statistically significant stock price movement include: 1) the type of event study conducted, 2) the criteria used to select the events, 3) whether the information properly has high or low valuation impact, 4) whether there is countervailing confounding information released on the same day, 5) the magnitude of background noise or price volatility in the data, 6) the extent to which the information was truly unexpected, 7) the source of the news announcement – the company itself, a regulator, commentators, or other third parties, and 8) whether or not the news emerged all at once or instead was staggered in a trickle out fashion. Dr. Bajaj does not consider these other factors when assessing the collective event study results against his unrealistic and unsupported threshold.

62. A 2016 paper by Dr. David Tabak, the same paper that Dr. Bajaj cites and relies on multiples times throughout his report, noted that there has been "no sound theoretical basis" provided for adopting a threshold criterion such as the 80%-90% significance rate standard imposed by Dr. Bajaj.

> "In fact, defendants have frequently argued that some large number of dates with news should be associated with statistically significant stock-price movements. Yet, it is not clear if there is any case in which defendants have cited some empirical or even sound theoretical basis for an argument that there should be some minimum fraction of news days associated with statistically significant returns."
> **"What Should We Expect When Testing for Price Response to News in Securities Litigation?" by David I. Tabak, NERA, August 2016, p. 5.**

63. Dr. Tabak elaborates, citing to: 1) the problems with a "theoretical standard," 2) previous academic literature, and finally 3) empirical analysis.

> "An easy, though informal, proof of why there is no theoretical basis for an argument that a specific share of news days should be associated with a statistically significant price movement can be made by pointing out that statistical significance is determined at various levels, with the 5% significance level being the most common in financial economics. Assume that under the 5% significance level, some fraction of news days is associated with statistically significant price movements when the series of event studies that form the FDT Test is undertaken. Under another significance level, say the stricter 1% significance level, a different, and smaller, fraction would be associated with statistically significant price movements. … ***There is no theoretical or mathematical/statistical reason to believe that the fraction of news days associated with statistically significant returns should exceed 50% as a general matter in an efficient market.***"
> **"What Should We Expect When Testing for Price Response to News in Securities Litigation?" by David I. Tabak, NERA, August 2016, pp. 5-6 (emphasis added).**

> "[Roll [1988] and Griffin, Hirschey, and Kelly [2011]] show that ***the assumption that half of all news days should be associated with statistically significant returns does not hold in practice***, at least for the news, stocks, and time periods covered by these articles."
> **Id., p. 7 (emphasis added).**

> "The analyses in this paper examine a similar question, considering the fraction of news events that are associated with statistically significant stock-price movements for individual companies when the traditional event-study methodology is employed. ***The results show that when we examine large companies and events that should be material to investors, such as relatively large earnings surprises, only about half of those news announcements are associated with a statistically significant stock-price movement.***"
> **Id., p. 14 (emphasis added).**

64. Other finance experts concur with these principles, as articulated by the eight testifying finance experts in *Halliburton II*.

> "Not every (or even most) of the predefined news dates in an event study would be expected to move the stock price ex ante, by an amount high enough to be statistically significant. There is no inherent reason why every news item included actually would contain 'new' material in formation that would alter expectations as to the stock's performance or value by a statistically significant amount (e.g., released earnings that simply meet pre-existing guidance)."
> **Brief of Testifying Economists as Amici Curiae in Support of Respondent, *Halliburton Co. and David Lesar v., Erica P. John Fund, Inc., FKA Archdiocese of Milwaukee Supporting Fund, Inc.*, 5 February 2014, p. 10.**

65. Not only is Dr. Bajaj's standard for market efficiency unrealistic, it is often unattainable given the design of the regression model, depending on how events are controlled for with dummy variables. Grossly mischaracterizing the Supreme Court's *Basic* decision, Dr. Bajaj imposes a standard for statistically significance that is theoretically untenable and logistically impossible. Specifically, he contends that in an efficient market, when material news is disseminated on 100 (or 20%) of days during a 500-day class period, one would expect to observe a statistically significant price reaction on 100% of news days or nearly that amount.

> "To illustrate this fatal flaw in the z-test approach, suppose there were 100 material news days for publicly traded 'Company A,' over a class period of 500 days in total. The logic of *Basic* and informationally efficient markets dictates that all or most of those 100 news days should result in statistically significant abnormal returns for Company A."
> **Bajaj Report, ¶96.**

66. What Dr. Bajaj apparently fails to understand, is that in practical terms, statistical significance at the 95% confidence level means that an event return resides in the 5% most extreme tail of the stock return distribution. Unless all or most of the 100 event dates in his example are dummied out of the regression, only 5% of the returns can possibly reside in the 5% most extreme tail. Either Dr. Bajaj believes that 20% of the regression's time series of returns must be dummied out, or a standard that all of them be statistically significant at the 95% confidence level is logistically impossible.

67. Dr. Bajaj's assertion that the frequency of statistically significant price reactions on news dates should be statistically indistinguishable from 100%, is unsupported, refuted in the finance literature, and logistically incompatible with generally accepted and widely used regression modeling. Consistent with the findings reported in the finance literature, the result that Freddie Mac stock exhibited statistically significant price movements on four out of nine news events in the collective event study is sufficient evidence to demonstrate informational market efficiency during the Class Period.

3. The Z-Test Assesses Informational Market Efficiency

68. Despite acknowledging that informational efficiency is the appropriate type of market efficiency to assess for a class action securities case, Dr. Bajaj levies criticisms that are only applicable when assessing fundamental market efficiency. Fundamental efficiency means that a security price conforms to a particular pricing model. Fundamental efficiency is a more restrictive and far-reaching condition than informational efficiency, and testing it necessarily requires an assumption about which valuation model is correct.

69. Dr. Bajaj criticizes the collective Z-test because it does not address whether the stock price "correctly" reflects "the value of the unexpected news," and does not address whether the observed price responses were in the correct direction.

> "in an efficient market, the stock price should promptly increase following unexpected positive news and promptly decrease following unexpected negative news, and such price changes should ***fully and correctly reflect the value*** of the unexpected news."
> **Bajaj Report, ¶26 (emphasis added).**

> "Dr. Feinstein's z-test does not account for the directionality of the price reaction, another key requisite of the cause and effect demonstration that is the *sine qua non* of market efficiency. If a market is to be considered efficient in incorporating new value relevant information, price reactions must correspond to the direction indicated by the nature of the information."
> **Id., ¶100.**

> "A. as candidates for examining market efficiency through cause-and-effect analysis, then it follows that if he chose the right dates, on those dates, he had a hypothesis that there was material news, ***he had a hypothesis as to the implication for the direction in which stock price should be expected to react to that news.***"
> **Bajaj Deposition at 51:24-52:8 (emphasis added).**

> "A. So to give further clarification that ***that price reaction would have to be in the anticipated direction***, have to be reasonably quickly enough, it would not, even then, be sufficient to establish semi-strong form of market efficiency over a 330-day class period."
> **Id. at 59:5-11 (emphasis added).**

70. Directionality and the correctness of the stock price are considerations of fundamental efficiency, not informational efficiency, rendering Dr. Bajaj's criticisms misguided.

71. Moreover, even if directionality and price correctness were counterfactually relevant considerations in the current case, this is no reason to dismiss the significant evidence of the cause and effect relationship that the collective Z-test provides. Furthermore, if, counterfactually, directionality and price correctness were relevant considerations, the analysis and debate between the experts would broaden to include arguments about which pricing model the stock price ought to conform to, and precisely how investors and analysts should have interpreted the flow of news received on information event dates. Dr. Bajaj raises no concerns or evidence in this case that the pricing model investors used was wrong, or that they interpreted news incorrectly. And, even if he had done so, he would not be refuting that the information in question reached the market and that the market reacted to it (informational efficiency). Rather, he would be arguing that his assessment of the information was better than the collective intelligence of the marketplace.

72. The appropriateness of focusing on informational efficiency rather than fundamental efficiency is articulated in the finance literature, by the Supreme Court in *Halliburton II*, and recently by the Court in the *Petrobras* matter.

73. Professor Fama explained that every test of fundamental market efficiency is also necessarily a joint test of the particular pricing model assumed. ("Efficient Capital Markets: II," by Eugene Fama, *The Journal of Finance*, Vol. 46, No. 5, December 1991) One cannot actually test fundamental efficiency therefore, because no test can determine whether an apparent perceived flaw is because the market is wrong or the model is wrong.

74. The Supreme Court in its *Halliburton II* decision explained:

> "Even the foremost critics of the efficient-capital-markets hypothesis acknowledge that public information generally affects stock prices. … Debates about the precise ***degree*** to which stock prices accurately reflect public information are thus largely beside the point. 'That the . . . price [of a stock] may be inaccurate does not detract from the fact that false statements affect it, and cause loss,' which is 'all that *Basic* requires.'"
> ***Halliburton Co. v. Erica P. John Fund, Inc.*, 134 S. Ct. 2398, 2410, 189 L. Ed. 339 (2014) (emphasis in original).**

75. I applied the same Z-test methodology in the *Petrobras* matter, and both the District Court and the Second Circuit noted that analysis of directionality is not required to demonstrate the necessary relationship between information and stock price movements.

> "Whether the market, upon receiving new information, moved in the precise way analysts or experts would expect it to move is not the key to unlocking *Basic's* presumption of reliance. What is essential is evidence that, when the market received new information, it 'generally affect[ed]' the price. *Halliburton*, 134 S. Ct. at 2410. In this case, the z-tests provide such evidence. Accordingly, the Court concludes that the limited evidence of directionality is not fatal to plaintiffs' showing of market efficiency."
> ***In re: Petrobras Sec. Litig.*, 312 F.R.D. 354, 369 (S.D.N.Y. 2016), at 52.**

> "The Petrobras Defendants' contentions on appeal amount to an intensified reformulation of the claim we bypassed above: not only should putative class plaintiffs be required to offer direct evidence of market efficiency, they argue, but the evidence must specifically consist of empirical data showing that the price of the relevant securities predictably moved up in response to good news and down in response to bad news. The gravamen of their claim is that plaintiffs would only be entitled to the *Basic*

> presumption after making a substantial showing of market efficiency based on directional empirical evidence alone, irrespective of any other evidence they may have offered. We reject this proposition."
> **Second Circuit Opinion, *In re: Petrobras Sec. Litig.*, Case 16-1914 Doc. 325, decided 7 July 2017, at 62.**

76. Dr. Bajaj acknowledges the distinction between fundamental and informational efficiency, but then proceeds to conflate them, resulting in misguided criticisms of my Z-test for purposes of testing informational efficiency.

4. Dr. Bajaj's Purported "Flaws" Concerning the Z-Test Are Misguided and Ultimately Moot

a. My Z-Test Results Are Robust to Small Sample Properties

77. In his report, Dr. Bajaj raised some concerns about the small-sample properties of the Z-test. He questioned whether the z-statistic's probability value is accurate for the number of events examined in the Z-test I conducted. Dr. Bajaj contends that the "news sample observations are too small for this procedure to be statistically valid." (Bajaj Report, ¶109)

78. Dr. Bajaj is wrong. First, the *Reference Manual on Scientific Evidence* notes that the use of "small samples ***may be*** unreliable, with large standard errors, broad confidence intervals, and tests having low power." (*Reference Manual on Scientific Evidence*, 3rd ed., Washington: The National Academies Press, 2011, p. 255) While there may be a problem with the Z-test when the number of observations in the news sample is small, it is not the case that there necessarily is a problem, and there are diagnostic tests which can be run, and which I did run to ensure that the results were valid. These diagnostic tests, and Dr. Bajaj's adjusted tests, confirmed the validity of the Z-test results, notwithstanding the small size of the news event sample.

79. As explained in my deposition, it is general practice that when running a Z-test, or any statistical test, for a quantitative analyst to also perform and review a series of diagnostic tests to confirm the robustness of the test to potential small-sample properties, and report any problems indicated by the diagnostic tests. In this current case the diagnostics confirmed the Z-test validity for the sample size used.

> "A. There are diagnostics that can be run to determine whether there's an impact of a relatively small population, something like the Fisher's exact test, which I did run and the diagnostic indicated there was no problem. But depending on the nature of the data and the null hypothesis and the sample size and the results, it may or may not be necessary. I ran diagnostics and found it was not an issue in this case."
> **Feinstein Deposition at 40:21-41:8.**

80. I performed three tests that verified that the Z-test results were indeed accurate and reliable. I conducted bootstrap analysis, the Fisher's Exact Test, and a binomial test. Dr. Bajaj examined these diagnostic test results and does not contest that they confirm the Z-test results.

81. Dr. Bajaj does contest whether the diagnostic tests are truly diagnostic of the Z-test or are alternative tests addressing the same question. I maintain that because these tests confirm the conclusions of the Z-test, they are indeed diagnostic, as they show that no small sample issues affected the results. Nonetheless, the distinction is moot (whether the tests are diagnostic tests or alternative tests) because Dr. Bajaj acknowledges that the bootstrap, Fisher's Exact, and binomial tests all confirm the results of the Z-test, namely that there was a significantly greater frequency of statistically significant returns on news days as compared to non-news days, thereby indicating that Freddie Mac stock reacts to news.

82. All three tests show that my results are robust to the potential sample size issue raised by Dr. Bajaj. The bootstrap test, Fisher's Exact test, and binomial test are described in greater detail in Appendix-1. The results of the bootstrap test, Fisher's Exact test, and binomial test are presented in Exhibit-3.

b. My Event Selection Criteria is Replicable, Objective, and Supported by the Academic Literature

83. As explained in the Feinstein Report, I examined "dates on which both the *New York Times* ('NYT') and *Wall Street Journal* ('WSJ') published articles about Freddie Mac. This screen identifies dates on which important news regarding Freddie Mac transpired. If the WSJ/NYT News Event Dates more frequently exhibited statistically significant stock returns than all other days, this finding would indicate a cause and effect relationship between the emergence of important information and changes in the stock price, which would be compelling empirical proof of market efficiency." (Feinstein Report, ¶101) I also considered when "the subject matter

of the WSJ/NYT News Event Dates was initially known by market participants by reviewing all news articles published within three days of the WSJ/NYT News Event Dates." (Id., ¶117)

84. In my deposition, I expounded on my reasoning for using *The Wall Street Journal* and *New York Times* as sources to identify event dates:

> "The Wall Street Journal is a preeminent financial news source, and New York Times is the, if not one of the, preeminent news sources for everything else. So the rule was that if both companies – if both news sources cover an event, one could be pretty sure that this was an important event in the life of the company."
> **Feinstein Deposition at 157:6-15.**

85. Dr. Bajaj contends that I used "an unprecedented and speculative 'news day' selection process that has no reasonable probability of discerning which days in the Class Period were in fact 'news days' and introduces selection bias." (Bajaj Report, p. 48) Dr. Bajaj also takes issue with my methodology for identifying the appropriate event test date, the date that the news that was being reported on actually took place and would impact the stock price in an efficient market: "In selecting 'news days' based upon the appearance of an article in both *The Wall Street Journal* and *The New York Times*, Dr. Feinstein did not select the date(s) that the articles were actually published (i.e. the date of the 'news')." (Id., ¶112) Dr. Bajaj asserts that my "method of selecting 'news days' renders [my] test highly speculative," and that there is "no scientific authority to support the notion that [my] selection criteria is reliable." (Id., ¶112 and ¶114)

86. On all counts, Dr. Bajaj is wrong. He is either unaware of or disregards the numerous academic papers in the finance literature that identify events based on news appearing in *The Wall Street Journal* and *The New York Times*. This event selection methodology is well-supported and widely used. For example:

> "The usual published sources, e.g., *the Wall Street Journal* or the *New York Times*, are used to select the announcement dates."
> **"Measuring The Effects of Regulation With Stock Price Data," by John Binder, *Rand Journal of Economics*, Vol. 16., No. 2., 1985, p. 168.**

> "The *New York Times* and the *Wall Street Journal* are the most useful sources, followed by case studies and regulation textbooks."
> **Id., p. 170.**

> "We obtain our sample from two sources. The first is the sample from Ikenberry et al. (1995) ***which consists of open market repurchase programs reported in the Wall Street Journal from January 1980 to December 1990.*** This is supplemented with announcements recorded at Securities Data Corporation over the full period, 1980 to 1996."
> **"Do Managers Time the Market? Evidence From Open-Market Share Repurchases," by Konan Chan, et al., *Journal of Banking & Finance*, vol. 31, 2007, p. 2677 (emphasis added).**

> "***Searching the Wall Street Journal, the New York Times***, and the Washington Post, we identified nine press dates from 1988 to 1990 on which articles appeared indicating significant changes in the likelihood that the commission would adopt increased penalties for corporate crimes, including Fraud."
> **"The Reputational Penalty Firms Bear From Committing Criminal Fraud," by Jonathan Karpoff and John Lott, *Journal of Law and Economics*, Vol. 36, No. 2, p. 793-794 (emphasis added).**

87. Brown and Warner [1980] note that it is appropriate to use *Wall Street Journal* articles to accurately identify the correct test date of the actual event:

> "But even if the researcher doing an event study has a strong comparative advantage at improving existing methods, a good use of his time is still in reading old issues of the Wall Street Journal to more accurately determine event dates."
> **"Measuring Security Price Performance," by Stephen Brown and Jerold Warner, *Journal of Financial Economics*, Vol. 8., 1980, p. 249.**

88. Further, Ferrilo, Dunbar, and Tabak [2004] state that "there are various ways" to select news dates for the Z-test, among which include using "major newspapers."

> "Because stock prices move all the time, one must compare the movements in response to news stories with a control group of prices. … Of course ***there are various ways to implement this procedure.*** For example, there is the choice of news sources to be searched (e.g., ***major newspapers*** and press wires versus all available news sources), and whether to limit the search to those stories where the company name and/or ticker is mentioned in the

> headline, the headline and lead paragraph, or anywhere in the story. One could also refine the search to only focus on particular types of news stories (e.g., earnings announcements)."
> **"The 'Less Than' Efficient Capital Markets Hypothesis: Requiring More Proof from Plaintiffs in Fraud-on-the-Market Cases," by Paul A. Ferrillo, Frederick C. Dunbar and David Tabak, vol. 78, *St. John's L. Rev.* 81, 119-22 (2004)**

89. Contrary to Dr. Bajaj's erroneous contention, my event selection methodology for the Z-test is well-supported by the academic literature. Moreover, Dr. Bajaj demonstrated that he was able to follow and replicate my methodology, as nowhere in the Bajaj Report does he suggest that I omitted any events that should have been included, or vice versa. Given that my event selection methodology is objective, replicable, and grounded in the literature, Dr. Bajaj's attacks are unfounded.

c. Dr. Bajaj Agrees That My Z-Test Results Are Robust Even When Excluding 20 November 2007

90. In the Feinstein Report, I showed that the results of the Z-test are robust to the exclusion of 20 November 2007. (Feinstein Report, ¶144) The reason this date was included in the collective study is because it satisfied the criteria for inclusion as a WSJ/NYT News Event Day, not because it was a corrective disclosure – a fact that Dr. Bajaj does not dispute.

91. In paragraphs 121 through 125 of the Bajaj Report, Dr. Bajaj contends that this date was improperly included, despite meeting the selection criteria, because it was also an alleged disclosure event. Ironically, he also argues that that date should not be examined in a traditional event study either. Nevertheless, Dr. Bajaj agrees that excluding 20 November 2007 from the Z-test does not change the qualitative results of the test, as, by his own admission, running the test without that date "yields a z-statistic of 3.53," which is still statistically significant at a 95% level, demonstrating market efficiency. (Bajaj Report, ¶125) I noted this fact in the Feinstein Report.

> "The test produces the same result supporting the same conclusion even if one were to remove the allegation-related event (20 November 2007) from the group of WSJ/NYT News Event Days. In this version of the test, 3 of 8 WSJ/NYT News Event Days are statistically significant, equivalent to an incidence rate of 37.5%. This incidence rate is statistically significantly greater than the 5.92% incidence rate for non-news days."
> **Feinstein Report, ¶144.**

d. Dr. Bajaj Agrees That My Z-Test Results are Robust to Unpooled Variance Estimation and the Inclusion of a Continuity Correction Factor, Rendering His Criticism Moot

92. In his report, Dr. Bajaj raises concern regarding my use of a pooled approach to estimating variance in the Z-test. (Bajaj Report, ¶¶126-129) However, by Dr. Bajaj's own calculations, using an unpooled variance estimator results in a z-statistic of 2.32, which is still statistically significant at the 95% level, indicating market efficiency. (Id., ¶129) That is, while I dispute the need for a variance adjustment or an alternative variance estimator, making the changes Dr. Bajaj recommends has absolutely no effect on the qualitative results and conclusions of the test.

93. He also suggests that because the "number of observations for the 'news-days' and statistically significant 'news-days' are relatively small, the z-statistic calculation should have employed a 'continuity correction.'" (Bajaj Report, ¶130) As Dr. Bajaj's own calculations show, even in conjunction with an unpooled variance approach, the z-statistic is 1.97 after both the continuity factor and the unpooled variance methodology are applied, which is statistically significant at the 95% level, still indicating an efficient market. (Id., ¶132)

e. Dr. Bajaj Agrees That Using Dummy Variables is Appropriate, Rendering His Criticism Purely Results Driven

94. As explained in the Feinstein Report, I used dummy variables in the regression model to control for the potentially abnormal returns on the WSJ/NYT News Event Dates. (Feinstein Report, ¶127) Dr. Bajaj does not dispute that the use of dummy variables for this purpose is appropriate. (Bajaj Report, ¶133) Rather, he contends that my use of dummy variables in the current case is somehow "inconsistent with the model [I] used in the *Petrobras* case." (Id., ¶133) Dr. Bajaj is wrong.

95. As explained in my deposition, in the *Petrobras* case I considered dummying out the 6-K events that were being examined in my Z-test, but "I didn't want to make that mistake or even raise the appearance that I was dummying out too many dates, such that the regression could be considered or considered unreliable." (Feinstein Deposition at 147:2-6) In the case of *Petrobras*, had I used dummy variables to control for all 6-K events, as Dr. Bajaj suggests, I would have removed over 36% of all dates (503 6-K dates divided by the 1,388 dates during the Class Period).

As I explained in my deposition, experts have had their testimony excluded for removing too many dates.

96. My different treatment of dummy variables between the *Petrobras* case and the instant Freddie Mac case was due to the different facts and circumstances of the two cases, in particular, the very large number of news dates in the Petrobras 6-K collective test, as compared to the smaller number of news dates in the Freddie Mac collective test. That Dr. Bajaj considers the different treatments to be an "inconsistency" such that my test is somehow "unreliable" is at odds with his own deposition testimony in the current matter.

> "Q. Because economists can and do use different approaches, depending on the facts and circumstances in the case; correct?
>
> A. In general, yes.
>
> Q. In fact, you've done so in cases, haven't you?
>
> A. I'm sure I tailor my approach depending on facts and circumstances."
> **Bajaj Deposition at 184:9-16.**

97. Dr. Bajaj's criticism is fallacious, as it is based on an incorrect premise that a finance expert should ignore the unique facts and circumstances of each case. The criticism is even at odds with his own testimony.

f. Dr. Bajaj Recommends Unnecessary Sub-Interval Examinations that Weaken the Z-Test

98. Dr. Bajaj argues that had I run the Z-test within each regression estimation sub-interval individually, as I had done in the *Eletrobras* matter, my results for the Z-test excluding 20 November 2007 would have been inconclusive in the latter half of the Class Period.

> "If he had followed the *Eletrobras* approach in this matter, and properly excluded November 20, 2007 as the FDT z-test requires, he would have found a z-statistic for Estimation Period 2 (August 9, 2007 to November) not to be statistically significant, leaving all other aspects of his analysis unchanged."
> **Bajaj Report, ¶140.**

99. Dr. Bajaj's criticism is again at odds with his own testimony in which he concurs that "Q. economists can and do use different approaches, depending on the facts and circumstances in the case. A. In general, yes." (Bajaj Deposition at 184:9-12) In the *Eletrobras* matter, the class period was approximately four and a half years long, with two estimation periods, each approximately two years in length. (Report on Market Efficiency, Professor Steven P. Feinstein, Ph.D., CFA, *In Re: Eletrobras Securities Litigation*, 30 June 2017) In the current matter, the Class Period is less than 16 months long. The Class Period in the instant case is less than half the length of the *Eletrobras* case class period. Examining portions of the class period in the *Eletrobras* case made sense, as each separate portion was long enough to produce a reasonably powerful test. Running the test on what would have been much smaller intervals in the instant Freddie Mac case results in a weakened test, from which inconclusive results would more reasonably be due to low power of the weakened test rather than potential inefficiency of the market.

100. Dr. Bajaj ignores the differential lengths of the class periods between the two cases he compares, and as such, his criticism is fallacious. Unlike the alterations that Dr. Bajaj advocates, which was to perform separate Z-tests on the relatively short segments of the split class period, the statistical methodology I conducted produced a more powerful test, and was appropriate and consistent with widely used and generally accepted practice.

g. Dr. Bajaj's Identification of An Additional Structural Break Appears to be an Exercise in "Data Snooping"

101. In paragraphs 141 to 143 of his report, Dr. Bajaj contends that I failed to identify another structural break in the data that he claims occurred on 27 February 2007. Dr. Bajaj opines, "Dr. Feinstein, however, fails to recognize that the same logic which compelled him to recognize the structural break also requires that he further subdivide the Class Period in light of a second, earlier structural break on February 27, 2007." (Bajaj Report, ¶141) Dr. Bajaj argues unconvincingly that a relatively short Class Period of less than 16 months should be divided into three distinct statistical regimes. Dr. Bajaj vaguely references changing levels of the VIX index, "market wide events" that he does not identify, and an unspecified Chow test analysis. (Id., ¶142)

102. Curiously, Dr. Bajaj did not identify this second structural break in his analysis of the Hallman Report. Instead, Dr. Bajaj opined in his previous report that the "the effect of substantially increased volatility … began in August 2007," (Expert Report of Mukesh Bajaj, Ph. D., dated 14 December 2012, ¶133) ("Bajaj 2012 Report") which is the date of the structural break I accounted for in my statistical analysis.

> "This pattern of deviation demonstrates that Dr. Hallman's model performs poorly starting in August 2007, suggesting that it does not effectively factor out the effect of substantially increased volatility that began in August 2007."
> **Bajaj 2012 Report, ¶133.**

> "Dr. Hallman's conclusions are speculative because he fails to account for the heightened volatility during the global credit crisis (which began August 9, 2007)."
> **Id., ¶30.**

103. In fact, in his deposition testimony about his previous report, Dr. Bajaj admitted that "volatility over this control period was almost identical to volatility through August 8, 2007, during the class period." That is, Dr. Bajaj previously concluded that there was no structural break prior to August 2007.

> "Q. If you're trying to estimate volatility in Freddie Mac stock price as of a particular date, would you use past data for that calculation or would you use data from stock returns beyond that date?
>
> A. It depends on facts and circumstances. You have to use a correction for volatility. and depending on facts and circumstances, you may use past data. But in a situation like this, when there is a sudden spike in volatility, as I explain in my report, ***volatility over this control period was almost identical to volatility through August 8, 2007, during the class period***."
> **Deposition of Mukesh Bajaj, Ph.D., dated 11 January 2013, at 176:15-177:3 (emphasis added).**

> "A. Well, there's a sudden spike on August 9, and if I recall correctly, ***the volatility during the control period was almost identical to the volatility for the part of the class period until August 8***. And then it jumped up, starting August 9, through November 20th, by over 70 percent. So clearly, there's a sudden spike in volatility that needs to be taken account of."
> **Id. at 181:11-19 (emphasis added).**

104. Dr. Bajaj's current testimony contradicts his previous testimony, suggesting that his methodology for identifying a second structural break on 27 February 2007 is results driven, rather than supported by any consistent set of principles. Dr. Bajaj's identification of 27 February 2007 appears to be nothing more than "data snooping." The Lo and Mackinlay [1990] paper that Dr. Bajaj cites, when accusing me of "data snooping," explicitly warns against the very methodology Dr. Bajaj employs to identify a purported second structural break.

> "[T]he more scrutiny a collection of data is subjected to, the more likely will interesting (spurious) patterns emerge."
> **"Data-Snooping Biases in Tests of Financial Asset Pricing Models," by Andrew Lo and A. Craig Mackinlay, *The Review of Financial Studies*, Vol. 3, No. 3, 1990, p. 432.**

> "In observing that economists (as well as those in the natural sciences) tend to seek out anomalies, Merton (1987, p. 107) writes: 'All this fits well with what the cognitive psychologists tell us is our natural individual predilection to focus, often disproportionately so, on the unusual … This focus, both individually and institutionally, together with little control over the number of tests performed, creates a fertile environment for both unintended selection bias and for attaching greater significance to otherwise unbiased estimates than is justified.'"
> **Id., p. 465.**

105. Given Dr. Bajaj's contradictory testimony and the fundamentally flawed methodology he employs to identify another structural break, his criticism that I should have further divided the Class Period into three sub-intervals is baseless.

h. A Baseless Concern About Uncertainty in the Distribution of Significance Incidence Under the Null Hypothesis

106. In paragraphs 144 through 145 of his report, Dr. Bajaj expresses his concern that because the classification of event returns as either significant or non-significant is determined from a statistical model, with some degree of uncertainty, then the Z-test statistic necessarily incorporates an additional source of uncertainty that is not captured by the usual z-statistic distribution.

107. Dr. Bajaj's expressed concerns lack legitimacy, for two reasons. First, Dr. Bajaj notes that he is unaware of any treatment in the literature for the supposed additional uncertainty in the distribution of significance incidence. He finds no treatment for this supposed problem in the literature, because there is no mention of the problem in the literature with respect to the Z-test. The literature does not share his concern or opinion that there is an unaddressed source of uncertainty.

108. Second, and the reason the literature does not share Dr. Bajaj's concern, is that no such problem exists. The distribution of the *t*-statistic underlying the determination of statistical significance is known, and it is known that there is a 5% probability of spurious significance at the 95% confidence level. This known probability of news event significance under the null hypothesis of inefficiency is the basis for the binomial diagnostic test. The binomial diagnostic test analytically determines the probability of the observed incidence of event significance under the null hypothesis of inefficiency, and it takes into account the statistical uncertainties about which Dr. Bajaj expresses concerns. As the binomial test confirms the results of the Z-test I conducted, Dr. Bajaj's concerns are addressed and moot.

D. Dr. Bajaj Seeks to Prove that the Alleged Misrepresentations and Omissions Had No Impact on the Price of Freddie Mac Stock, But He Does Not and Cannot Do So

1. The Statistically Significant Decline in Freddie Mac Stock in Response to the 20 November 2007 Disclosure Event, Which Dr. Bajaj Does Not Dispute, Is Direct Evidence of Price Impact

109. As explained in the Feinstein Report, an event study is essentially a controlled experiment that allows one to observe the market's valuation of a security with and without the information at issue. Prior to an event, a security is valued in the marketplace without the new information. After the event, the security is valued with the new information. A significant security price change elicited by an event reflects the valuation impact of the new information. (Feinstein Report, ¶138)

110. Dr. Bajaj does not dispute that Freddie Mac stock exhibited a statistically significant price decline following the 20 November 2007 corrective disclosure. Dr. Bajaj does not dispute that the residual decline on 20 November 2007 following the corrective disclosure that day was -32.13%. This severe residual decline is associated with a *t*-statistic of -19.30, indicating that

it was the company disclosures made that day, not a market effect, a sector effect, or random volatility that caused the stock price to fall. Dr. Bajaj does not dispute that price movements of such large magnitude cannot be attributed to market and peer group factors, or to random volatility, but rather are attributable to the Company-specific news that transpired that day.

111. Dr. Bajaj has two arguments for a lack of price impact despite the significant decline on 20 November 2007: 1) the lack of statistically significant price increases on the earlier dates when the Company allegedly made misrepresentations and omissions; (Bajaj Report, ¶167) and, 2) a contention that none of the disclosures that came out on 20 November 2007 had anything to do with the alleged misrepresentations and omissions. Dr. Bajaj claims, "the news on November 20, 2007 indicates that the announcements by Freddie Mac were not corrective of previous misstatements or the materialization of alleged prior undisclosed risks, and hence the price decline on this date cannot be indicative of a statistically significant price impact in response to alleged misrepresentations and omissions" (Bajaj Report, ¶169) Both of Dr. Bajaj's arguments are fundamentally flawed and false.

2. That Dr. Bajaj Does Not Observe a Higher Frequency of Statistically Significant Price Movements on The Alleged Misrepresentation and Omission Dates Proves Nothing

112. Nowhere in the Bajaj Report does Dr. Bajaj actually conclude that there was no price impact. Rather, Dr. Bajaj skirts around drawing that definitive conclusion by opining only that "the economic evidence demonstrates that the alleged misrepresentations had no impact on Freddie Mac's stock price." (Bajaj Report, ¶163) However, the "economic evidence" that Dr. Bajaj cites to requires the erroneous premise that "an economist would expect Freddie Mac's abnormal return to be positive and statistically significant on the effective date following an allegedly inflationary misrepresentation (assuming no confounding information)." (Id., ¶164)

113. It is not true that an inflationary misrepresentation or omission will always cause a statistically significant price increase. There are several situations where a misstatement or omission may cause artificial inflation, and hence have a price impact, but nonetheless not elicit a statistically significant price increase. The lack of a statistically significant price increase does not prove the impact never happened. For example, when misleading statements or omissions maintain market expectations, they may not cause a significant stock price reaction, while they do cause artificial price inflation. Such statements, which confirm prior expectations or prior

misrepresentations (referred to as confirmatory misstatements), or conceal adverse developments, would generally not move the stock price significantly in an efficient market. Such statements create inflation by preventing a stock price decline that would have otherwise occurred had the full truth been told.

114. Another example is where a misrepresentation is made alongside countervailing confounding news that impacts the stock price in the opposite direction. One might not reasonably expect the mix of information to cause a statistically significant stock price reaction, even though the misrepresentation did impact the price, causing the price to be artificially inflated above what it otherwise would have been. Though Dr. Bajaj agrees with this concept – i.e. "assuming no confounding information" (Bajaj Report, ¶164) – he performs no analysis of the information content on any of the 23 alleged misrepresentation and omission dates.

115. Moreover, when the nature of the news is that the appropriate stock price reaction to a piece of news is moderate, one would not necessarily see a statistically significant stock price movement in an efficient market. As I explained in the Feinstein Report:

> "Significant reactions to disclosures of information correcting the alleged misrepresentations and omissions in this case indicate market efficiency, not only generally, but also specifically with respect to the information at issue in this case. This approach is particularly appropriate where, as here, it appears that the alleged misrepresentations were confirmatory of market expectations, and were therefore unlikely to elicit any statistically significant common stock returns."
> **Feinstein Report, ¶100.**

116. This important principle, apparently overlooked or misunderstood by Dr. Bajaj, is also presented in the generally accepted forensic finance literature:

> "Statements that allegedly inflated the share price often do not result in an observed price increase when they were made. For example, one might not expect large increases in share prices for a firm that inflated its stock price by falsely reporting high earnings, if it consistently met market expectations."
> **"Federal Securities Acts and Areas of Expert Analysis," by Nicholas I. Crew, *et al.*, in Chapter 18 of the *Litigation Services Handbook*; *The Role of the Financial Expert*, 4th ed., edited by Roman L. Weil, Peter B. Frank, Christian W. Hughes, and Michael J. Wagner, John Wiley & Sons, Inc., 2007, pp. 18.14-15.**

117. Dr. Bajaj, himself, acknowledges this basic principle in his own published writing:

> "It is not infrequent in securities class actions that there is no statistically significant price reaction on the dates of the alleged misrepresentations."
> **"Assessing Market Efficiency for Reliance in the Fraud-On-The-Market Doctrine After *Wal*-Mart and Amgen," by Mukesh Bajaj, Sumon Mazumdar, and Daniel McLaughlin, *The Law and Economics of Class Actions*, Vol. 26, 2014, p. 181.**

118. It is also important to keep in mind a fundamental principal of classical statistical hypothesis testing that failing to prove a proposition does not disprove the proposition or prove the opposite of the proposition to be true. While statistically significant reactions to news prove price impact, non-significant movements do not prove there was no price impact.

> "We should emphasize that if the null hypothesis [H_0] is not rejected, based on the sample data, we cannot say that the null hypothesis is true. To put it another way, failing to reject the null hypothesis does not prove that H_0 is true, it means we have *failed to disprove* H_0."
> ***Statistical Techniques in Business and Economics*, by Robert D. Mason, Douglas A. Lind, and William G. Marchal, 10th Edition, Irwin McGraw-Hill, 1999, p. 307 (emphasis in original).**

119. This principle is especially applicable when the price impact is reasonably moderate based on the nature of the news. It would be erroneous to conclude that because Dr. Bajaj failed to detect statistically significant price increases following some misrepresentation or omission events, it necessarily follows that the alleged misrepresentations or omissions had no price impact. For all of the above reasons, Dr. Bajaj's analysis of the alleged misrepresentations and omission dates offers little insight into the issue of price impact, and certainly support no conclusion that the alleged misrepresentations and omissions had no impact on the price of Freddie Mac stock.

a. Not Even Potential Data Mining Can Undermine the Apparent Price Impact Observed on 27 February 2007

120. Dr. Bajaj's finding that one of the alleged misrepresentation and omission dates, 27 February 2007, was "statistically significant and positive" is inescapable evidence of price impact, notwithstanding his proffered opinion that he found no evidence of price impact. Dr. Bajaj attempts to dismiss this finding by contorting the statistical analysis to locate a set of assumptions (a 3-period structural break model) under which the residual return on this alleged misrepresentation

event date fell just below the threshold for statistical significance at the 95% confidence level. (Bajaj Report, ¶166)

121. The statistical modeling Dr. Bajaj applies to the analysis of this particular event is not consistent with the modelling Dr. Bajaj uses for the rest of his price impact statistical analysis, which suggests that the alternative modeling applied to this troubling misrepresentation event may be due to results-driven "data mining," rather than legitimate statistical analysis.

122. Moreover, even if, *arguendo*, Dr. Bajaj's statistical finding with respect to 27 February 2007, were not the result of "data mining," it would still be inappropriate to ignore the large positive price movement that he observed on 27 February 2007, or to conclude that the response to the news that day was merely a random fluctuation rather than an inflationary stock price increase caused by the alleged misrepresentations. As explained in the Feinstein Report, certain news can be "economically significant, though it may not appear statistically significant. In such a case, a non-statistically significant price reaction would not indicate inefficiency or lack of price impact." (Feinstein Report, ¶107) The residual price increase on 27 February 2007 is unusually large regardless of which statistical modeling is applied to examine it, and as such, a claim of non-significance does not prove that none of that price increase was caused by the alleged misrepresentations and omissions that transpired that day.

3. Dr. Bajaj's Selective and Cursory Review of the 20 November 2007 Disclosures Is Inadequate and Flawed

123. Based on a "review of the news" on 20 November 2007, Dr. Bajaj contends that "Freddie Mac's announced losses of November 20, 2007 were related to the accounting treatment of losses and depressed market prices caused by adverse macroeconomic changes, rather than new revelations about Freddie Mac's business model risks or about Freddie Mac's subprime exposure risks." (Bajaj Report, ¶171) That is, Dr. Bajaj claims that none of the losses whatsoever stemmed from the disclosures related to the alleged misrepresentations and omissions. In his review, Dr. Bajaj considered the Company's press release, conference call, and analyst reports "over the seven days following November 20, 2007." (Id., ¶173)

124. Dr. Bajaj's portrayal of the documents he reviewed as containing no "new revelations about Freddie Mac's business model risks or about Freddie Mac's subprime exposure risks," (Bajaj Report, ¶171) is wrong, and his error derives from his too limited review of the news and his too narrow definition of the Plaintiff's allegations. The Company's disclosures on 20

November 2007 were clearly related to the Plaintiff's allegations of misrepresentations and omissions, and Dr. Bajaj's opinion is incompatible both with the Company's disclosures and contemporaneous market commentary in response to the disclosures.

125. The foundation of Dr. Bajaj's argument is two-fold: 1) that the Company's ***press release*** did "not even mention the terms 'subprime,' 'nontraditional loan products' or 'fraud'," (Bajaj Report, ¶67) suggesting that the Company did not attribute the losses in Q3 2007 to the allegation-related information; and, 2) that when the Company conference call, Company information statement, and analyst commentary did in fact mention the "terms 'subprime,' 'nontraditional loan products' or 'fraud'," the statements were not mirror image corrections of prior misrepresentations and omissions alleged by the Plaintiff. (Id., ¶¶169-171). Both foundations of Dr. Bajaj's opinion are unsound.

a. Applying Dr. Bajaj's Analysis, The Company's Information Statements Proves Price Impact

126. Dr. Bajaj incorrectly asserts that because the Company's 20 November 2007 press release did "not even mention the terms 'subprime,' 'nontraditional loan products' or 'fraud', which according to the Plaintiff are the central issues about which the Defendants had misled investors during the Proposed Class Period" (Bajaj Report, ¶67), the Company release on that date cannot be a corrective disclosure. Not only is Dr. Bajaj's logic faulty, as discussed above, but his argument founders because he considers only the language in the press release and ignores the information provided by the Company's information statement and the language used therein.

127. If Dr. Bajaj's assertion is that the use of the terms "subprime" and/or "nontraditional loan products" establishes a link between the disclosures and the alleged misrepresentation and omissions, then the language in the Company's information statement provides this link. Freddie Mac's 20 November 2007 information statement did use the terms "subprime" and "nontraditional" 51 and 26 times, respectively. (Freddie Mac, Financial Report for Three Months Ended 30 September 2007, filed 20 November 2007)

b. Dr. Bajaj's Mirror Image Requirement is Unfounded

128. Dr. Bajaj argues that because the Company's announcement on 20 November 2007 did not expressly admit to correcting specific previous misstatements, these disclosures were not corrective of the misrepresentations and omissions alleged by the Plaintiff, and therefore those

alleged misrepresentations and omissions are not proved to have had price impact. (Bajaj Report, ¶67) In essence, Dr. Bajaj requires corrective disclosures to mirror the alleged misrepresentations and omissions. Not only is Dr. Bajaj's objection more an inappropriate legal opinion than an opinion within the realm of financial analysis, but the standard he adopts in his report is at odds with his own deposition testimony.

> "Q. You'd agree with me that a company does not need to admit a committed fraud for inflation to come out of the stock price?
>
> A. Under certain circumstances that could be true."
> **Bajaj Deposition at 92: 8-12.**

129. Nevertheless, the mirror image standard adopted by Dr. Bajaj is contradictory to the Plaintiff's allegations that the information disclosed on 20 November 2007 was a materialization of previously undisclosed risks. Dr. Bajaj's incorrect conclusion that none of the information disclosed on 20 November 2007 constitutes corrective information follows from his narrow and imprecise characterization of the Plaintiff's allegations. Had Dr. Bajaj performed a broad and impartial analysis, he would have found that the information disclosed on 20 November 2007 was indeed related to the Plaintiff's allegations, as the Company and analysts attributed the poor results (including provisions for credit losses) to subprime and non-traditional mortgage products. Dr. Bajaj's position that none of the 32.13% residual decline in the stock price is related to credit losses and/or deterioration in the Company's capital position stemming from subprime and non-traditional mortgage products is untenable, at odds with case facts, and contrary to financial principles.

130. The Company's disclosures in its information statement on 20 November 2007 establish the connection between exposure to subprime and nontraditional mortgage products and the Company's reported poor results and weakened capital position. The following excerpts demonstrate this link:

> "The credit performance of subprime and Alt-A loans, as well as other non-traditional mortgage products, deteriorated sharply during 2007."
> **Freddie Mac Financial Report For The Three And Nine Months Ended September 30, 2007, dated 20 November 2007, p. 1.**

"[S]ome of our credit guarantees were issued during the nine months ended September 30, 2007 with contractual fee rates that resulted in investment returns below our normal expected return thresholds."
Id., p. 3.

"The delinquency rate on our single-family guaranteed PC and Structured Securities portfolio, representing those loans which are 90 days or more past due and excluding loans underlying Structured Transactions, increased to 51 basis points as of September 30, 2007 from 42 basis points as of December 31, 2006."
Id.

"We believe our provision for credit losses and REO operations expense together provide a reasonable measure of the increased exposure to mortgage credit losses for our guarantee activities during each period. As a result of observed credit deterioration, higher foreclosure transition rates and higher losses per property, our provision for credit losses increased to $1,197 million for the three months ended September 30, 2007 as compared to $93 million for the three months ended September 30, 2006."
Id., p. 4.

"The credit deterioration in our guaranteed PC and Structured Security portfolio during 2007 has been largely driven by a decline in house prices, increasing volumes of non-traditional mortgage loans and other declines in regional economic conditions. If these conditions do not improve, we expect credit losses will continue to rise from the current level and will we have further increases in our provision for credit losses in future periods."
Id., p. 6.

"The sharp decline in the housing market and volatility in financial markets are adversely affecting our capital, including our ability to manage to the 30% mandatory target capital surplus. Factors that could adversely affect the adequacy of our capital in future periods include GAAP net losses; continued declines in home prices; increases in our credit and interest-rate risk profiles; adverse changes in interest-rate or implied volatility; adverse OAS changes; legislative or regulatory actions that increase capital requirements; or changes in accounting practices or standards. As a result of the impact of these items on our GAAP net income and in order to manage to the 30% mandatory target capital surplus and respond to regulatory concerns, as well as to have the flexibility to effectively manage our business, we are planning on taking several actions."
Id.

131. The following commentary from management and analysts on the Company's conference call further demonstrate the linkage between the Company's exposure to subprime and nontraditional mortgage products and the poor financial results reported on 20 November 2007.

> "[Anthony Piszel, CFO]: Credit is clearly worsened. We have taken over $4.6 billion in credit costs year-to-date, which is almost 50% of the 10 billion we expect to ultimately incur. The mark-to-market items have been extreme."
> **"Federal Home Loan Mortgage Corp. Q3 2007 Earnings Call," *FactSet: callstreet*, 20 November 2007, p. 8.**

> "[Anthony Piszel, CFO]: we have engaged Lehman Brothers and Goldman Sachs to help us consider capital raising alternatives in the very near term. Second, we are seriously considering a 50% reduction in our common dividend. These actions coupled with other management steps should provide sufficient capital flexibility for us to manage the company for our shareholders and meet our charter through the balance of this credit downturn."
> **Id., p. 8.**

> "[Paul Miller, FBR Capital Markets analyst]: I think there's a lot of numbers thrown out there that you said that you expected 10 to $12 billion of losses, but you've written down that asset by 17 billion, and to realize that loss you would need to double the severity rate which we saw in the early '90s. Can you just go over some of that a little more slowly?"
> **Id., p. 9.**

> "[Howard Shapiro, Fox-Pitt, Kelton analyst]: On your subprime exposure, the securities where you've got somewhere be 29 and plus subordination, can you tell us how those securities might differ from the subprime collateral that's in the marketplace as a whole, specifically the subprime collateral that's in the ABX index that's marked at substantial discounts to par?"
> **Id., p. 12.**

> "[Moshe Orenbuch, Credit Suisse analyst]: could you address whether the subprime securities will have to be written down through earnings on other than temporary impairment basis and how that would affect the capital that you need to raise?
> …

[Anthony Piszel, CFO]: let me tell you Moshe, we have done significant cash flow testing. We have actually got very little of the portfolio that even gets into the impairment calculation because it has to go below 90 cents in a dollar before we would consider it for impairment and then even for the little bit that's gotten there, it's roughly $150 million, there is no losses that we would expect taking.

…

[Moshe Orenbuch, Credit Suisse analyst]: That's a Freddie, that 90% is a Freddie Mac policy? It's not consistent with the way I understood it but...?"
Id., p. 13.

"[Robert Lacoursiere, Bank of America Analyst]: Yes, I just wonder if you could help me understand how you come up with these – the valuations for the LIA loans. There's obviously not a market. So what are you using like a Level 2 approach, and where do you get the inputs from?

[Patricia Cook, Chief Business Officer]: No. Actually we do get LIA marks from the Street, and you're right, and part of that is probably reflected in the price. It is in illiquid market. It's certainly not trading as many of the other securities that we own trade but we do go to the Street for an independent mark.

[Robert Lacoursiere, Bank of America analyst]: But they never actually trade. You don't actually sell these things. You are just asking them to quote you a figure, right?

[Patricia Cook, Chief Business Officer]: Right. But you're on to a good point, Robert, because I think the same thing is in evidence when we price the overall GO. If you think about it, our – the mortgages that we're guaranteeing in our g-fee business really don't trade in securitized, in a AAA senior sub sort of structure. So, even there the fact that we take that structure, we go to the market, we ask for a price on something that really doesn't trade I think supports the notion that the uncertainty in the credit risk premium that's embedded in those marks is likely to overshoot in a cautious credit environment.

[Robert Lacoursiere, Bank of America analyst]: Well, that is precisely my point. I'm just wondering why you have to rely on those quotes when there's no market. Why can't you do a Level 3 approach and put your own assumptions in like other institutions do?"
Id., p. 14.

132. Analyst commentary published in response to the Company's 20 November 2007 further evidence the link between the Company's reported poor financial results and its exposure to subprime and nontraditional mortgage products.

> "***After FNM's poor 3Q07 results two weeks ago***, we downgraded the GSEs and lowered our FRE estimates in anticipation of similarly weak results. But in what is becoming the norm for mortgage companies, ***FRE's results were worse than expected***. FRE reported a 3Q07 GAAP loss per share of $3.29, and an estimated operating loss of ($0.43), well below our estimate of $0.43 per share of earnings. Mgmt had warned that widening spreads could create a GAAP loss, ***but the new disclosure of even higher credit costs than FNM had revealed triggered heavy selling.*** Furthermore, the news of a potential dividend cut and capital raise ***further heightened investor concern***. Mgmt also indicated that 4Q results could look like 3Q, with more confusing GAAP adjustments that are difficult to measure or quantify in advance."
> **"FRE Posts Big 3Q07 Miss On Worse Than Expected Credit," Lehman Brothers, 21 November 2007, p. 1 (emphasis added).**

> "Freddie Mac, like Fannie Mae, was also affected by the sharp decline in quoted prices for delinquent sub prime loans in Q3. While there is no market for delinquent credit enhanced conforming mortgages, the companies obtain bids from dealers ***who apparently have no interest in buying delinquent loans (and those quotes are apparently for loans without credit enhancement)*** and those bids are used to value the company's credit risk on delinquent loans repurchased out of trusts."
> **"GAAP Loss Reflects Reduced Market Liquidity and Is Restricting Liquidity As Well," by David Hochstim and Michael Nannizzi, Bear Stearns, analyst report, 20 November 2007, p. 2 (emphasis added).**

> "The 3Q loss of $3.29 per share was driven primarily by credit deterioration, both in the form of a sharply higher provision for credit losses, as well as mark-to-market losses due to widening credit spreads. … We are reviewing our estimates and placing our Buy rating and $87 price target (based on DDM) under review, as ***we look to clarify the credit and capital outlook***."
> **"Placing Under Review as We Clarify Credit and Capital Outlook," by Eric Wasserstrom and Robert Peruzzi, UBS, analyst report, 20 November 2007, p. 1 (emphasis added).**

133. The abundance of Company conference call commentary, analyst commentary, and statements in the Company's filings indisputably link at least some of the Company's poor financial results reported on 20 November 2007 to its exposure to subprime and nontraditional mortgage products. Dr. Bajaj claims there was no link whatsoever. He is plainly wrong, and this error alone renders his conclusion of no price impact unproven and erroneous.

IV. CRITIQUE OF THE GOMPERS REPORT

A. My Damages Methodology Is Appropriate and Applicable in this Matter

134. As explained in the Feinstein Report, "valuation tools, which would include event study analysis such as that described herein, and potentially other empirical analyses if necessary, would be used to establish that the disclosure(s) correcting the alleged misrepresentations and omissions, caused the price of Freddie Mac common stock to fall." (Feinstein Report, ¶152(i)) As previously explained, the full array of valuation tools, if necessary, including the event study and other empirical analyses, can be used to calculate the but-for stock price and construct the inflation ribbon. The inflation ribbon would be the basis for the per share damage computation. I analyzed the facts of the current case and the market for Freddie Mac stock to ascertain that this common methodology can be used to measure damages under Section 10(b).

135. In the Feinstein Report, I also explained that an inflation ribbon would be constructed, "using generally accepted empirical analysis and valuation tools, indicating ***how much artificial inflation*** caused by the alleged misrepresentations and omissions was in the price of the Freddie Mac common stock on ***each day during the Class Period***." (Feinstein Report, ¶152(ii)) That is, if varying investment risk is an issue, the full set of generally accepted and widely used valuation tools can be applied to measure the valuation impact of risk, just as investors and analysts routinely take this factor in account in real time.

136. Dr. Gompers has four main criticisms of the damages methodology described in the Feinstein Report: 1) that my proposed methodology "fails to articulate any specific methodology for calculating damages;" (Gompers Report, Section V.B) 2) that my "proposed damages approach is inconsistent with Plaintiff's materialization of risk theory of liability;" (Gompers Report, Section V.C) 3) that I have "not articulated a methodology that can account for changes in market

conditions during the Proposed Class Period;" (Gompers Report, Section V.D) and 4) that my "proposed damages approach fails to distinguish among multiple types of alleged misrepresentations." (Gompers Report, Section V.E) As discussed below, Dr. Gompers challenges certain details of the implementation, not the methodology or the appropriateness of the model itself. He acknowledges that a common model exists.

1. Damages Are Measured the Same Despite How the Artificial Inflation Dissipated

137. The common damages formula quantifies how much investment loss any particular investor suffered as a result of the alleged fraud having artificially inflated the stock price – i.e., out-of-pocket damages. As explained in the Feinstein Report, out-of-pocket damages can be measured as the difference between the amount of share price inflation at purchase and the amount of inflation in the share price at sale, taking into account formulaic prescriptions in relevant case law (e.g., *Dura*) and statutes. I explained that class-wide damages in response to the specific misrepresentations and omissions ultimately established by the Plaintiff can be calculated in a straightforward manner common to all Class members. In fact, I noted that the methodology discussed in the Feinstein accommodates the calculation of individual and class-wide damages stemming from various alleged misrepresentations and omissions, and therefore will accommodate alternative potential determinations of liability. The theory of liability is that the misstatements and omissions inflated the stock price. Materialization of the risk is the manner in which the artificial inflation dissipated. Consequently, the artificial inflation model of damages applies well to a materialization of the risk case.

138. Dr. Gompers contends that my "proposed damages approach is inconsistent with Plaintiff's 'materialization of previously concealed risks' theory of liability." (Gompers Report, ¶11) Specifically, he further contends that I did not "provide a methodology that can account for the realization of disclosed risks on the alleged corrective disclosure date." (Id., ¶11)

139. The manner in which artificial inflation is dissipated, whether it be through a corrective disclosure event or a materialization of the risk event, is a legal construct that has no impact on the calculation of out-of-pocket damages from an economics perspective. That is, whether inflation dissipates in response to an announcement, or alternatively in response to materialization of the risk, from the perspective of an analyst measuring out-of-pocket damages, is irrelevant. The distinction between a corrective announcement and a materialization of the risk

event is the manner in which the artificial inflation dissipates. The same economic analysis (including valuation and empirical event study analysis) can be used to estimate the relationship between specific statements or sets of statements and the subsequent effect on prices, in the case of affirmative statements, omissions, and/or risk materialization. As such, class-wide damages in response to the specific misrepresentations and omissions ultimately established by the Plaintiff can be calculated in a straightforward manner common to all Class members.

140. If the inflation ribbon is computed correctly, the same damage model computes damages accurately for all investors regardless of how the inflation dissipates. Of course, care should certainly be taken to compute the inflation ribbon correctly. This fact is common to all models, irrespective of whether the corrective disclosure took the form of an announcement or a materialization of the risk, and therefore is not a defect in the methodology proposed in the Feinstein Report.

2. The Common Damages Methodology Handles All Purported Valuation Complexities

141. While Dr. Gompers does not dispute that the proposed per share damages methodology outlined in the Feinstein Report is appropriate and applicable in the current case, he contends that the presentation of the methodological framework must also provide the exact details of the loss causation and damages analyses that will be implemented to calculate damages at a later stage of this action. He suggests that various complexities may be encountered in the implementation of the damages methodology and that it is necessary at this stage to explain with specificity how these purported complexities would be overcome. However, Dr. Gompers does not identify a single factor that valuation analysis cannot account for when constructing an inflation ribbon. Though he contends various valuation complexities may be encountered during implementation, Dr. Gompers acknowledges that the methodology can handle them.

> "[T]o appropriately measure damages, Plaintiff would need to separate losses that can be tied to the alleged misrepresentations from i) losses that were the result of risks that were disclosed, as well as ii) losses that were the result of the dramatic shift in market conditions."
> **Gompers Report, ¶9.**

> "Dr. Feinstein does not articulate any methodology that can ascertain how investors would have viewed Freddie Mac's growth and risks had hypothetical disclosures been made correcting the alleged misrepresentations at earlier points in the Proposed Class Period."
> **Id., ¶11(b).**

> "Dr. Feinstein's proposed approach for calculating damages also does not account for the fact that Freddie Mac made several key disclosures about risks related to its mortgage loan portfolio throughout the Proposed Class Period that were realized on November 20, 2007, simultaneously with the allegedly concealed risks."
> **Id., ¶11(c).**

> "An appropriate damages methodology must also be able to take into account changing market conditions because the value of stock price inflation from the alleged misrepresentations can change due to changes in the economic environment."
> **Id., ¶12.**

> "Finally, an appropriate damages methodology would also need to assess the varying amount of inflation in Freddie Mac's stock price caused by each of the different types of alleged misrepresentations identified by Plaintiff."
> **Id., ¶13.**

142. Dr. Gompers pointing out what a properly constructed inflation ribbon must reflect is essentially a concession that a common damages methodology exists and is appropriate so long as the inflation ribbon reflects various issues he considers to be relevant.

143. Essentially, Dr. Gompers argues that the but-for valuation must be conducted correctly. Dr. Gompers' critique is not a condemnation of the damages model, but rather a caution that it should be implemented carefully and correctly. I agree. However, it is premature at this stage to challenge the specific implementation of the methodology, instead of whether the methodology exists and can be implemented correctly. Dr. Gompers concedes that the methodology exists, and his concerns about whether it can be implemented correctly overlooks the fact that market participants are able to arrive at valuations for virtually all publicly traded securities, all the time, in real time, under exactly the same conditions of changing information mixes that Dr. Gompers contends present complexities in the current case.

144. Valuation analysis, as undertaken continuously, every day, for virtually every publicly traded security, aims to ascertain the price at which informed market participants would trade any particular security. In an efficient market, traders and investors update their valuations continuously to reflect changes in information. The very same set of tools that traders and investors employ to revalue securities in real time to account for changing information and risk can be applied by forensic analysts to value a security under alternative scenarios and information regimes. Because it is market participants' valuations that forensic analysts seek to replicate, the exercise is virtually always feasible. I found no complexities in the current case, and Dr. Gompers identified none, that would cause the current case to be an exception.

145. Just as investors and analysts avail themselves of a wide variety of valuation tools to revalue a stock when market conditions change, the forensic analyst computing damages in this case can use the same tools. In fact, the forensic analyst has at his or her disposal the same comprehensive array of tools plus the additional benefit of observing how the stock price did change when the artificial inflation dissipated. Among the commonly used valuation tools that are available to investors and analysts in real time, and to forensic analysts when computing damages, are: valuation multiple models, such as those based on earnings, EBITDA, revenue, book value, and cash flow; discounted cash flow models (DCF); return attribution analysis; and the literature regarding valuation effects of factors such as reputation and quality of accounting. In addition, forensic analysts have the added benefit of event study analysis. The valuation analysis necessary to compute inflation and damages is clearly feasible.

146. In his deposition, Dr. Gompers agreed with this principle:

> "A. In general, the specifics of calculating damages in a 10b-5 matter is not an area that's researched in financial economics. What is and what's particularly relevant is the underlying pinnings of modern finance, which is that modern finance – the core is to examine how – how information translates into price, and how do we understand the relationship between information and prices."
> **Gompers Deposition at 60:6-16.**

147. Dr. Gompers expresses concern that "even if measuring damages using these valuation approaches were feasible, both discounted cash flow and multiples analysis require making subjective judgments in order to conduct valuation." (Gompers Report, ¶61) However, his deposition testimony contradicts the position presented in his report:

> "Q. And that discounted cash flow analysis requires make subjective judgments in order to conduct valuation, correct?
>
> A. You make decisions based on your training. So they're expert decisions. They're expert judgments that are based – based in reason. So you outline what the assumptions were, and somebody could replicate what you did, but you form the basis for those based on expert judgment.
>
> Q. I understand, but those are subjective judgments that are being made under the discounted cash flow analysis in order to conduct the valuation, correct?
>
> A. I wouldn't call them subjective. I would call them, they're expert judgments. They are reasons based – reasons based on first principles."
> **Gompers Deposition at 82:20-83:15.**

148. If Dr. Gompers' position is that computing damages in this matter is impossible because of purported complexities he anticipates, he is wrong. These purported valuation complexities are not insurmountable. The construction of the inflation ribbon is an application of standard valuation analysis.

3. Dr. Gompers' Criticism of My Proposed Damages Methodology is Unfounded

149. With respect to how the inflation ribbon would be ultimately constructed, Dr. Gompers attacks a straw man of his own creation rather than the methodology I proposed. Dr. Gompers' criticisms are directed at a hypothetical inflation ribbon, which I have not yet constructed, but which he wrongly assumes will be constructed a particular way. Specifically, his criticisms are directed at a hypothetical inflation ribbon that will hold inflation constant from the end of the Class Period back to the beginning. Dr. Gompers misstates the Feinstein Report and my testimony by incorrectly asserting that the inflation ribbon would undoubtedly hold inflation constant equal to "the stock price decline on November 20, 2007."

> "Dr. Feinstein's proposed event study approach using the price decline on the alleged materialization date to 'back-cast' inflation at the time of each alleged misrepresentation or concealment of risk necessarily overstates the appropriate amount of stock price inflation at the time the risk was concealed because it reflects the price reaction when the risk became a certainty."
> **Gompers Report, ¶68.**

> "By 'back-casting' the stock price drop on November 20, 2007, to the beginning of the Proposed Class Period, Dr. Feinstein's approach would overstate damages by the amount that the price decline reflected realization of the disclosed risks (all else equal)."
> **Id., ¶75.**

150. Essentially, Dr. Gompers is arguing that the model must be flawed because it may be executed incorrectly. He fails to accept that the model can be executed correctly, and of course, care will be exercised to do so. To reiterate, I have not yet conducted the loss causation and damages analyses, but will do so at the appropriate stage, if asked to, and the inflation ribbon will appropriately reflect the difference between the stock price that actually prevailed in the marketplace and the price Freddie Mac stock would have traded at had there been no misrepresentations or omissions.

151. Dr. Gompers' criticisms pertain to a hypothetical inflation ribbon he assumes, not the methodological framework I described in the Feinstein Report. By pointing out what a properly constructed inflation ribbon would reflect throughout his report, Dr. Gompers concedes that the common damages methodology is indeed feasible as long as the inflation ribbon is constructed appropriately to reflect various valuation issues he anticipates will be relevant.

152. In his report, Dr. Gompers misquotes the Feinstein Report and deposition testimony, to create the misleading impression that I had stated that the inflation ribbon approach to damage computation was equivalent to the backcasting method of inflation ribbon construction. He misstates my report and testimony to suggest that I held that backcasting is the only tool available to construct an inflation ribbon.

153. To the contrary, I never stated one should use only the backcasting tool to the exclusion of all other valuation techniques to compute the inflation ribbon and damages. What I did state was that one could use all available valuation tools, in combination with the backcasting tool, if the facts and record of this case compel such use. Whether the backcasting tool alone will prove to be appropriate given the facts of this case, depends on the record to be developed.

154. As explained in the Feinstein Report, I would use generally accepted empirical analysis and valuation tools, to determine "***how much artificial inflation*** caused by the alleged misrepresentations and omissions was in the price of the Freddie Mac common stock on ***each day during the Class Period***." (Feinstein Report, ¶152(ii)) I also explained that "out-of-pocket damages can be measured as the difference between the amount of share price inflation at purchase and the amount of inflation in the share price at sale, taking into account formulaic prescriptions in relevant case law (e.g., *Dura*) and statutes." (Feinstein Report, ¶151)

155. The damages model and methodology described above and in the Feinstein Report is a standard and well-accepted method for determining class-wide damages.

V. LIMITING FACTORS AND OTHER ASSUMPTIONS

156. This report is furnished solely for the purpose of court proceedings in the above referenced matter and may not be used or referred to for any other purpose. The analysis and opinions contained in this report are based on information available as of the date of this report. I reserve the right to supplement or amend this report, including in the event additional information becomes available.

Steven P. Feinstein, Ph.D., CFA

VI. APPENDIX-1: DIAGNOSTICS FOR POTENTIAL SMALL SAMPLE ISSUES

157. As shown in the Feinstein Report and Exhibit-9 to that report, Freddie Mac stock traded on 330 days during the Class Period, of which 23 days were statistically significant. Of the total 330 days in the Class Period, I identified nine event dates using the objective selection criteria explicated in the Feinstein Report. (Feinstein Report, ¶117) Of the 9 event dates, 4 proved to be statistically significant, which amounts to an incidence frequency of 44.44%. Of the 321 non-event dates, 19 were statistically significant, which is an incidence frequency of 5.92%.

158. The question that is addressed by the Z-test is whether or not the greater frequency of statistically significant returns in the news event sample could have occurred as a result of random chance alone. The Z-score in the Z-test is well above the critical value, indicating that the answer to this question is, "no." The 44.44% frequency of significant returns could not reasonably have happened by random chance alone.

159. Dr. Bajaj raises a concern, that when the number of observations in one or both of the groups of returns is small, the Z-test may be weak and the critical Z-scores may not be accurate. Notwithstanding the defense that a weak test would be less likely to demonstrate market efficiency, I ran three tests that measure the small sample reliability of the Z-test in this application. The first is a bootstrap test. The second is the Fisher's Exact Test. The third is the Binomial test.

160. The bootstrap test that I ran for this purpose is identical to the bootstrap test described by Hartzmark and Seyhun. ("The Curious Incident of the Dog That Didn't Bark and Establishing Cause-and-Effect in Class Action Securities Litigation," by Michael L. Hartzmark, and H. Nejat Seyhun, *Va. L. & Bus. Rev*. 6 (2011)) The bootstrap test is a simulation that examines how often one might arrive at a result, for example, where a group of 9 events produces 4 significant observations, while a second group of 321 observations produces 19 significant observations, on account of random chance alone. The simulation is constructed such that there is actually no difference between the properties of the two groups. The simulation is run 100,000 times. If the simulation finds that in less than 5% of the 100,000 iterations there are 4 or more significant events in the group of 9 news events, that finding proves that such an occurrence (4 of 9) is so rare as to be deemed statistically significant. It could not reasonably have happened by random chance alone.

161. I modeled the bootstrap test as hypothetically creating two "buckets". Each bucket contains 330 balls, which represents the total number of days during the Class Period. In Bucket #1, I have 9 red balls (representing the news event days) and 321 blue balls (the non-event days). In Bucket #2, I have 23 yellow balls (representing the statistically significant days) and 307 green balls (representing the non-statistically significant days).

162. For the simulation, I then (virtually) draw one ball from each bucket simultaneously and record the results, which can be either:

Bucket #1 Blue, and Bucket #2 Yellow; or

Bucket #1 Red, and Bucket #2 Yellow; or

Bucket #1 Blue, and Bucket #2 Green; or

Bucket #1 Red, and Bucket #2 Green.

163. This first draw randomly assigns to the first observation the characteristic of being an event day or non-event day, and without reference to the type of day, it also assigns to the observation the characteristic of being a significant or non-significant observation.

164. Without replacing the balls, I draw again, repeatedly, recording my results, until all 330 balls from the two buckets are depleted. At that point, I measure the number and frequency of yellow balls (significant returns) associated with the 9 red balls (events days).

165. I repeat this experiment 100,000 times, and observe how often I obtained 4 or more yellow balls (significant events) associated with the 9 red balls (event days).

166. As shown in Exhibit-3, using the parameters and processes described above, based on random chance alone it would be a rare occurrence that I would draw a yellow ball (significant event) associated with a red ball (event day) even a single time.

167. This simulation shows that if WSJ/NYT News Event Dates and significant returns were independent phenomenon, with no connection other than random chance, I would find that 4 significant events out of the total 9 event days is highly statistically significant.

168. The likelihood of observing 4 or more event days being statistically significant, represented in the bootstrap simulation as drawing yellow balls associated with red balls, turns out to be far less than 5%. In fact, it is virtually nil.

169. However, because the actual results of my collective event study were that 4 out of 9 WSJ/NYT News Event Dates were statistically significant, the findings from the bootstrap experiment confirm the statistical finding and qualitative conclusion from the Z-test, that one should reject the null hypothesis that the two samples are independent (rejecting the proposition that there is no relationship between information and statistically significant price movements).

170. The results of the bootstrap tests demonstrate that Dr. Bajaj's concerns regarding small sample size is speculative, misguided, and demonstrably wrong in this particular case.

171. The results of the bootstrap test described above and a bootstrap test excluding 20 November 2007 are shown in Exhibit-3.

172. An alternative to the bootstrap simulation for testing the small sample properties of the Z-test is the Fisher's Exact Test and the Binomial Test. Exhibit-3 also present the results of those tests, which further confirm the findings of the bootstrap simulation and the Z-test.

Exhibit-1

Documents and Other Information Considered
In Addition to Those Listed in My June Report

CASE DOCUMENTS

- Deposition of Mukesh Bajaj, Ph.D., dated 11 January 2013.
- Report on Market Efficiency, Professor Steven P. Feinstein, Ph.D., CFA, dated 7 June 2017.
- Deposition of Steven P. Feinstein, Ph.D., dated 10 August 2017.
- Expert Report of Mukesh Bajaj, Ph.D., dated 1 September 2017.
- Expert Report of Paul A. Gompers, dated 1 September 2017.
- Deposition of Paul Gompers, dated 15 September 2017.
- Deposition of Mukesh Bajaj, Ph.D., dated 26 September 2017.

ACADEMIC AND PROFESSIONAL LITERATURE

- Bajaj, Mukesh, et al., "Assessing Market Efficiency for Reliance on the Fraud-on-the-Market Doctrine After Wal-Mart and Amgen," *Law and Economics*, Volume 26, 2014.
- Brown, Stephen J. and Jerold B. Warner, "Measuring Security Price Performance," *Journal of Financial Economics*, Volume 8, 1980.
- Chan, Konan, et al., "Do managers time the market? Evidence from open-market share repurchases," *Journal of Banking and Finance*, Volume 31, 2007.
- Fedenia, Mark and Mark Hirschey, "The Chipotle Paradox," *Journal of Applied Finance*, Issues 1 & 2, 2009.
- Hartzmark, Michael L. and H. Nejat Seyhun, "The Curious Incident of the Dog That Didn't Bark and Establishing Cause-and-Effect in Class Action Securities Litigation," *Va. L. & Bus. Rev.* 6 (2011).
- Karpoff, Jonathan M., and John R. Lott, "The Reputational Penalty Firms Bear From Committing Criminal Fraud," *The Journal of Law and Economics*, Volume 36, No. 2, October 1993.
- Lamont, Owen and Richard Thaler, "Anomalies: The Law of One Price in Financial Markets," *Journal of Economic Perspectives*, 2003.
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- Lo, Andrew and A. Craig Mackinlay, "Data-Snooping Biases in Tests of Financial Asset Pricing Models," *The Review of Financial Studies*, Vol. 3, No. 3, 1990.
- Mason, Robert D., et al., *Statistical Techniques in Business and Economics*, 10th Edition, Irwin McGraw-Hill, 1999.
- Mitchell, Mark, et al., "Limited Arbitrage in Equity Markets," *The Journal of Finance*, 2002.

Exhibit-1

Documents and Other Information Considered
In Addition to Those Listed in My June Report

- Tabak, David I., "What Should We Expect When Testing for Price Response to News in Securities Litigation?" NERA, August 2016.

LEGAL CASES

- *Lehocky v. Tidel Tech., Inc.*, 220 F.R.D. 491 (S.D. Tex. 2004).
- *Lumen v. Anderson*, No. 08-0514-CV-W-HFS (W.D. Mo. Feb. 10, 2012).
- *Halliburton Co. v. Erica P. John Fund, Inc.,* 134 S. Ct. 2398, 2410, 189 L. Ed. 339 (2014).
- *McIntire v. China Media Express Holdings, Inc.*, 38 F. Supp. 2d 415 (S.D.N.Y. 2014).
- *City of Sterling Heights General Employees' Retirement System v. Prudential Financial, Inc., et al.,* No. 2:12-cv- 05275-MCA-LDW (D.N.J.), 31 August 2015.
- *In re Petrobras Securities Litigation*, No. 14-cv-9662 (JSR) (S.D.N.Y. Feb. 2, 2016).

OTHER

- Expert Report of Mukesh Bajaj, *In re Federal Home Loan Mortgage Corp.,* No. 09 Civ. 832 (MGC), dated 15 August 2011.
- Expert Report and Declaration of Mukesh Bajaj, *In re: American International Group*, dated 17 August 2011.
- *Reference Manual on Scientific Evidence*, 3rd ed. (Washington: The National Academies Press, 2011).
- Brief of Testifying Economists as Amici Curiae in Support of Respondent, *Halliburton Co. and David Lesar v., Erica P. John Fund, Inc., FKA Archdiocese of Milwaukee Supporting Fund, Inc.*, 5 February 2014.
- Second Circuit Opinion, *In re: Petrobras Sec. Litig.*, Case 16-1914 Doc. 325*,* decided 7 July 2017.
- Report on Market Efficiency, Professor Steven P. Feinstein, Ph.D., CFA, *In Re: Eletrobras Securities Litigation*, 30 June 2017.
- Any other documents and data cited in the report.

Exhibit-2
Steven P. Feinstein, Ph.D., CFA
Testimony Provided Since my June Report

In Re LSB Industries, Inc. Securities Litigation
Master File No. 1:15-cv-07614-RA
United States District Court
Southern District of New York
Deposition Testimony
June 2017

In Re Resource Capital Corp. Securities Litigation
Master File No. 1:15-cv-07081-LLS
United States District Court
Southern District of New York
Deposition Testimony
July 2017

In Re Federal Home Loan Mortgage Corporation Securities Litigation
Master File No. 4:08-cv-00160-BYP
United States District Court
Northern District of Ohio Eastern Division
Deposition Testimony
August 2017

In Re American Realty Capital Properties Inc. Securities Litigation
Master File No. 1:14-cv-08668-ER
United States District Court
Southern District of New York
Deposition Testimony
June 2017
Testimony at Evidentiary Hearing
August 2017

In Re Eletrobras Securities Litigation
Master File No. 1:15-cv-5754-JGK
United States District Court
Southern District of New York
Deposition Testimony
September 2017

In Re Insulet Corporation Securities Litigation
Master File No. 15-12345-MLW
United States District Court
District of Massachusetts
Deposition Testimony
October 2017

Exhibit-3

Freddie Mac Collective Test Robustness Checks

	WSJ/NYT News Event Days	*WSJ/NYT* News Event Days Excluding Corrective Disclosure
Z-Test Results		
p-value	0.0004%*	0.02%*
Fisher's Exact Test Results		
p-value	0.18%*	1.17%*
Bootstrap Test Results		
p-value	0.17%*	1.17%*
Binomial Test Results		
p-value	0.06%*	0.54%*

Note:

* Indicates p-values that are statistically significant at the 95% confidence level.

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- Brown, Stephen J. and Jerold B. Warner, "Measuring Security Price Performance," *Journal of Financial Economics*, Volume 8, 1980.
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- Fedenia, Mark and Mark Hirschey, "The Chipotle Paradox," *Journal of Applied Finance*, Issues 1 & 2, 2009.
- Hartzmark, Michael L. and H. Nejat Seyhun, "The Curious Incident of the Dog That Didn't Bark and Establishing Cause-and-Effect in Class Action Securities Litigation," *Va. L. & Bus. Rev.* 6 (2011).
- Karpoff, Jonathan M., and John R. Lott, "The Reputational Penalty Firms Bear From Committing Criminal Fraud," *The Journal of Law and Economics*, Volume 36, No. 2, October 1993.
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- Mason, Robert D., et al., *Statistical Techniques in Business and Economics*, 10th Edition, Irwin McGraw-Hill, 1999.
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Documents and Other Information Considered
In Addition to Those Listed in My June Report

- Tabak, David I., "What Should We Expect When Testing for Price Response to News in Securities Litigation?" NERA, August 2016.

LEGAL CASES

- *Lehocky v. Tidel Tech., Inc.*, 220 F.R.D. 491 (S.D. Tex. 2004).
- *Lumen v. Anderson*, No. 08-0514-CV-W-HFS (W.D. Mo. Feb. 10, 2012).
- *Halliburton Co. v. Erica P. John Fund, Inc.,* 134 S. Ct. 2398, 2410, 189 L. Ed. 339 (2014).
- *McIntire v. China Media Express Holdings, Inc.*, 38 F. Supp. 2d 415 (S.D.N.Y. 2014).
- *City of Sterling Heights General Employees' Retirement System v. Prudential Financial, Inc., et al.,* No. 2:12-cv- 05275-MCA-LDW (D.N.J.), 31 August 2015.
- *In re Petrobras Securities Litigation*, No. 14-cv-9662 (JSR) (S.D.N.Y. Feb. 2, 2016).

OTHER

- Expert Report of Mukesh Bajaj, *In re Federal Home Loan Mortgage Corp.,* No. 09 Civ. 832 (MGC), dated 15 August 2011.
- Expert Report and Declaration of Mukesh Bajaj, *In re: American International Group*, dated 17 August 2011.
- *Reference Manual on Scientific Evidence*, 3rd ed. (Washington: The National Academies Press, 2011).
- Brief of Testifying Economists as Amici Curiae in Support of Respondent, *Halliburton Co. and David Lesar v., Erica P. John Fund, Inc., FKA Archdiocese of Milwaukee Supporting Fund, Inc.*, 5 February 2014.
- Second Circuit Opinion, *In re: Petrobras Sec. Litig.*, Case 16-1914 Doc. 325*,* decided 7 July 2017.
- Report on Market Efficiency, Professor Steven P. Feinstein, Ph.D., CFA, *In Re: Eletrobras Securities Litigation*, 30 June 2017.
- Any other documents and data cited in the report.

Exhibit-2
Steven P. Feinstein, Ph.D., CFA
Testimony Provided Since my June Report

In Re LSB Industries, Inc. Securities Litigation
Master File No. 1:15-cv-07614-RA
United States District Court
Southern District of New York
Deposition Testimony
June 2017

In Re Resource Capital Corp. Securities Litigation
Master File No. 1:15-cv-07081-LLS
United States District Court
Southern District of New York
Deposition Testimony
July 2017

In Re Federal Home Loan Mortgage Corporation Securities Litigation
Master File No. 4:08-cv-00160-BYP
United States District Court
Northern District of Ohio Eastern Division
Deposition Testimony
August 2017

In Re American Realty Capital Properties Inc. Securities Litigation
Master File No. 1:14-cv-08668-ER
United States District Court
Southern District of New York
Deposition Testimony
June 2017
Testimony at Evidentiary Hearing
August 2017

In Re Eletrobras Securities Litigation
Master File No. 1:15-cv-5754-JGK
United States District Court
Southern District of New York
Deposition Testimony
September 2017

In Re Insulet Corporation Securities Litigation
Master File No. 15-12345-MLW
United States District Court
District of Massachusetts
Deposition Testimony
October 2017

Exhibit-3

Freddie Mac Collective Test Robustness Checks

	WSJ/NYT News Event Days	*WSJ/NYT* News Event Days Excluding Corrective Disclosure
Z-Test Results		
p-value	0.0004%*	0.02%*
Fisher's Exact Test Results		
p-value	0.18%*	1.17%*
Bootstrap Test Results		
p-value	0.17%*	1.17%*
Binomial Test Results		
p-value	0.06%*	0.54%*

Note:

* Indicates p-values that are statistically significant at the 95% confidence level.